

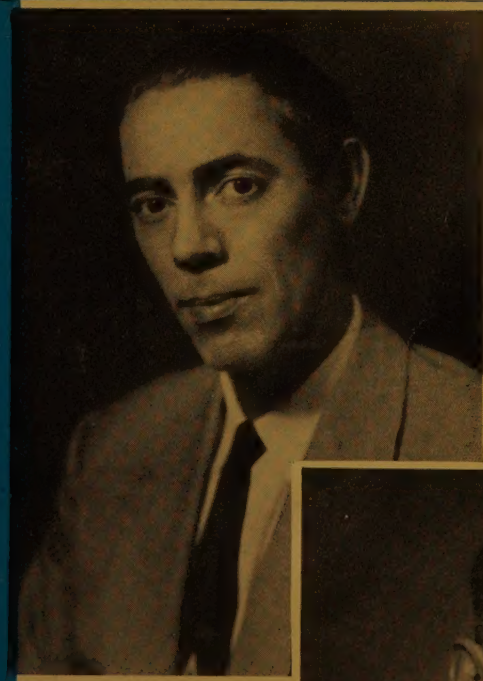
AGRICULTURAL

Chemicals

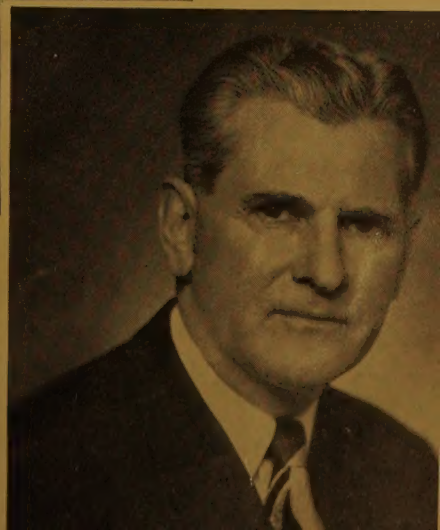
IN
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- Granular Chemicals in 1959
- Screening Fertilizers
- Insect Resistance Symposium
- Gas Fired Fertilizer Drier
- Sales and Marketing of Pesticides
- Promotion of Pesticides
- Inventory Control for the Formulator
- A Flying Tractor
- Fertilizer In-Plant Shrinkage
- Applicator Section

NOVEMBER, 1959



George Ferguson
Geigy Agricultural
Chemicals Division
of Geigy Chemicals Corp., vice
president of NAC



Jack V. Vernon,
Niagara Division,
Food Machinery
& Chemical Corporation, president of NAC.

what's

your

EQ?

QUESTIONS

True False

1. Inorganic salts are frequently added to oil-water systems to break emulsions. ☐ ☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts. ☐ ☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds. ☐ ☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water. ☐ ☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components. ☐ ☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency. ☐ ☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance. ☐ ☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates. ☐ ☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs. ☐ ☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates. ☐ ☐

*Emulsifier Quality

ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with non-ionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

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Jack Vernon



George Ferguson

This Month's Cover

Jack Vernon and George Ferguson, elected president and vice-president, respectively, of the National Agricultural Chemicals Association. See story on p. 38.

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Vol. 14, No. 11

November, 1959

AGRICULTURAL

Chemicals

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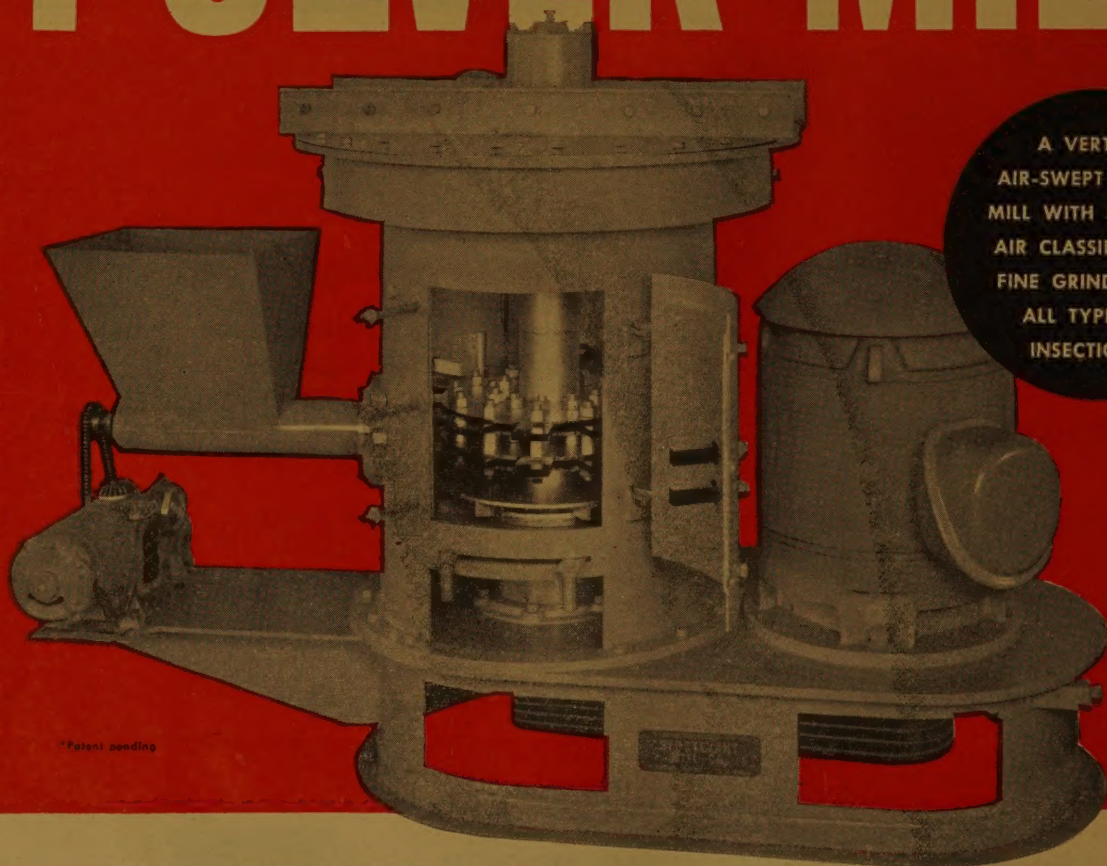
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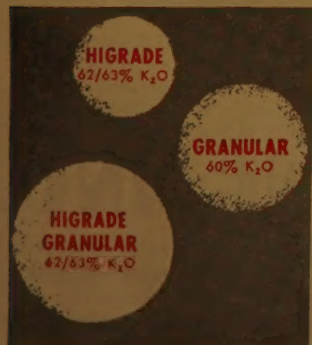
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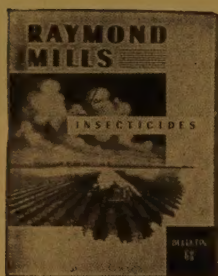
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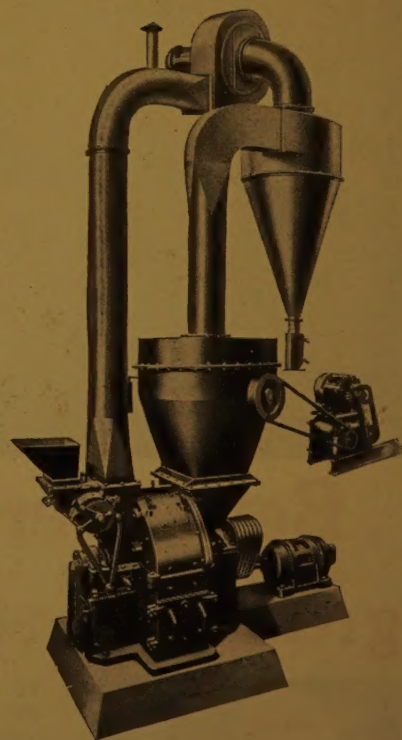
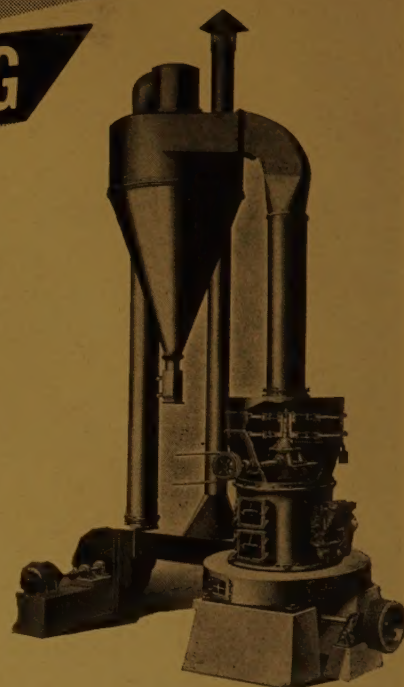
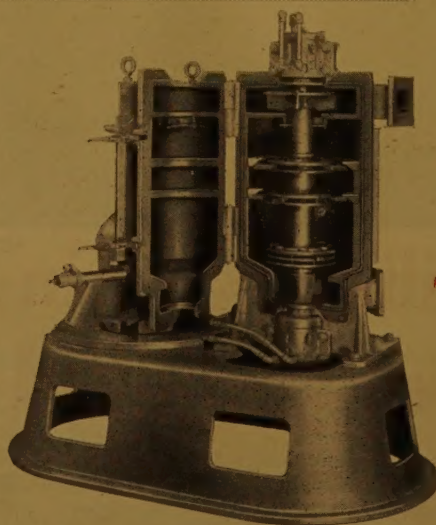
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MEETING CALENDAR

- Nov. 4-6—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.
- Nov. 9 — South Carolina Plant Food Educational Society, Clemson House, Clemson, S. C.
- Nov. 8-10—National Fertilizer Solutions Assn., annual convention, Statler Hilton Hotel, St. Louis, Mo.
- Nov. 9-11 — California Fertilizer Assn., 36th Annual Convention, Fairmont Hotel, San Francisco.
- Nov. 12-15—Texas Aerial Applicators Association, Orange House, Orange, Texas.
- Nov. 16-17—Farm Chemicals Marketing Seminar, Barbizon Plaza Hotel, New York City.
- Nov. 16-20 — National Aviation Trades Assn., 20th Annual Convention, Hotel Monteleone, New Orleans, La.
- Nov. 24—Conference for Pesticide Dealers, Blake Hall, Rutgers Univ., New Brunswick, N.J.
- Nov. 30-Dec. 2 — Carolinas-Virginia Pesticide Formulators Assn. Carolina Hotel, Pinehurst, N. C.
- Nov. 30-Dec. 3—Joint meeting of Entomological Society of Canada and Entomological Society of America, Detroit, Mich.
- Nov. 30-Dec. 2—Soil & Crop Science Soc. of Florida, Gainesville, Fla.
- Nov. 30-Dec. 4 — Exposition of Chemical Industries, New York Coliseum, New York City.
- Dec. 7-9 — 46th annual meeting, Chemical Specialties Manufacturers Assn., Mayflower Hotel, Washington, D. C.
- Dec. 7-10—Western Canadian and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Manitoba, Canada.
- Dec. 9-11 — International Crop Protection and Pest Control Exhibition, Seymour Hall, St. Marleybone, London, England.
- Jan. 6-7—Pesticide Conf., University of Wisconsin, Madison.
- Jan. 6-8—Northeastern Weed Control Conf., 14th annual meeting, Hotel New Yorker, New York.
- Jan. 14, 15—Beltwide Cotton Production Conference, Memphis, Tenn.
- Jan. 14-16 — California Agricultural Aircraft Association, 10th Annual Convention, El Mirador Hotel, Palm Springs, Calif.
- Jan. 13-15 — Agricultural Ammonia Institute, 9th Annual Convention, Statler-Hilton Hotel, Dallas, Tex.
- Jan. 20-21 — Northwest Agricultural Chemicals Industry Conf., Benson Hotel, Portland, Ore.
- Jan. 21—Northeast Region, National Plant Food Institute fertilizer workshop, Hotel Hershey, Hershey, Pa.
- Jan. 25-26—Indiana Pesticide Conf., Memorial Center, Purdue Univ., Lafayette, Ind.
- March 22-23—Western Agricultural Chemicals Asso., Miramar Hotel, Santa Barbara, Calif.



*In the
Spotlight
this Month*

- **Selling Pesticides . . .** Elimination of consignment selling, and maintaining proper profit margins to perform the selling job needed to introduce industry products . . . cited as major factors in the successful operation of a pesticide operator. Page 42.
- **Fertilizer In-Plant Shrinkage . . .** Intentional and unintentional loss of Fertilizer in the plant runs as high as 15%, compared with a standard 2% loss some ten years ago. Dust collectors, modern materials handling and good plant housekeeping are among practical efforts to reduce material loss. Page 46.
- **Public Relations—Legislation . . .** Two problems facing the pesticide industry which have grown in magnitude to the point that they now fall in the urgent category,—concern attacks on agricultural pesticides by various interests. This public relations problem directly affects legislation at all levels. Both topics were discussed at the pesticide industry's annual meeting. Page 38.
- **Fertilizer Screening . . .** A combination screening and classifying unit reported to operate successfully at International Fertilizers, Ltd. Granular yield is improved, and nitrogen losses reduced, because of lower recirculating load. Page 33.
- **Inventory Control . . .** The number of items and cost of an inventory requires adequate record keeping. Turnover, percentage of value, time and dollar limits, physical counts, and forecasting are the tools with which most management should be thoroughly familiar and facile in their use. Page 55.
- **Agricultural Applicator . . .** Of particular interest to the operator this month, is a report on a home made spray rig, a discussion of the pros and cons of flying tractors, and an article on aerial forest spraying in Canada. Pages 61-71.
- **Granular Chemicals . . .** 1959 marked a new era in the sales and use of granular agricultural chemicals. The advantages and limitations of this relatively new product form are reported on Page 30.

1

2

3

4

5

A NEW Measure of Values for Mixing Triples . . .

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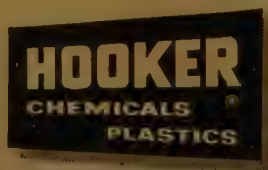
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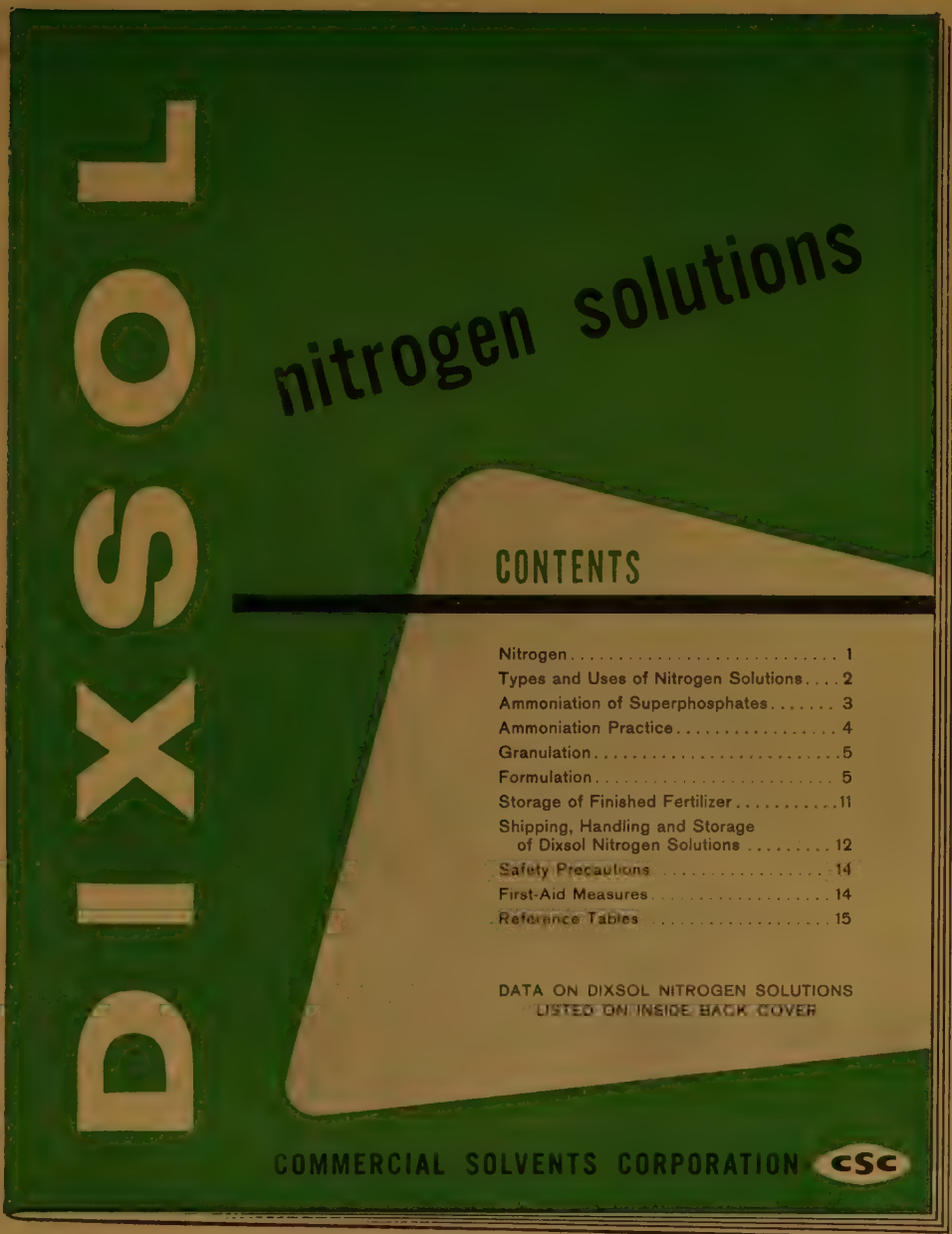


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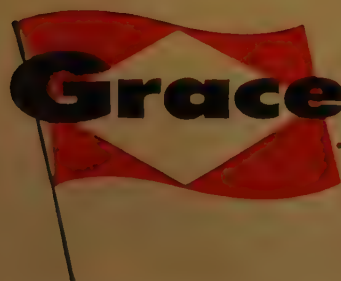
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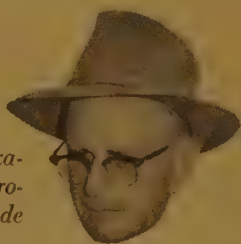
THESE MEN HAVE LEARNED FROM EXPERIENCE THAT TOXAPHENE MAKES DOLLARS...AND SENSE



Hartford Jackson, Columbia, La. *"I set about the best cotton crop I have ever seen, following the toxaphene, toxaphene-DDT control program . . ."*

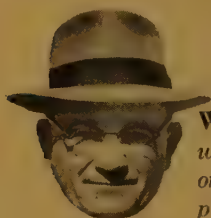
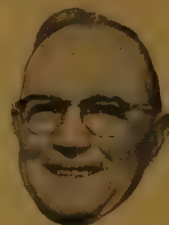


P. E. Cloutier, Bermuda, La. *"We set one of our best crops last year, and we think the toxaphene, toxaphene-DDT insect control program was a big factor. We're basing our 1959 program on the same plan . . ."*



D. L. Hall, Eudora, Ark. *"The toxaphene and toxaphene-DDT control program certainly worked for me, and made me money . . ."*

Morris A. Roberson, Gilliam, La. *"I like the early production and early harvest that comes with the toxaphene insect control program. We had good control all season, and I plan to use the same program this year . . ."*



W. E. Moore, Sherrill, Ark. *"We were able to pick cotton two weeks earlier on the acreage where we followed this program. It really paid off for us . . ."*



Clarence R. Smith, Cleveland, Miss. *"We believe in this program. It gave us excellent insect control, saved us money, and helped us make a cotton crop under adverse conditions . . ."*

H. C. Bradney, Montrose, Ark. *"This program saves me expensive late-season applications and does an excellent job. Last year I cut my insect control costs in half . . ."*



O. L. Garmon, Jr., Marks, Miss. *"I used the toxaphene program on more than 700 acres of cotton. I know you need to get the overwintered boll weevil, and this program does that. I had good insect control all year . . ."*



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Insecticide salesmen have to do more than just take orders for dusts and sprays. In the Mid-South, for example, progressive formulators and dealers are showing cotton farmers how a planned, season-long insect control program based on toxaphene can be the most satisfactory—and profitable—practice. These statements from farmers already following such a program reflect the growing interest in more effective use of insecticides.

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Here are two examples of recent developments by Spencer's Technical Department. Photo above shows tank cars of new SPENSOL 440 that withstood temperatures to -17°F . without salting out. Photo at right shows equipment used by Spencer to perfect an improved preneutralization process.

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A pair of new SPENSOL GREEN Nitrogen Solutions (430 and 440) make it possible for you to save as much as \$1.97 per ton on sulfuric

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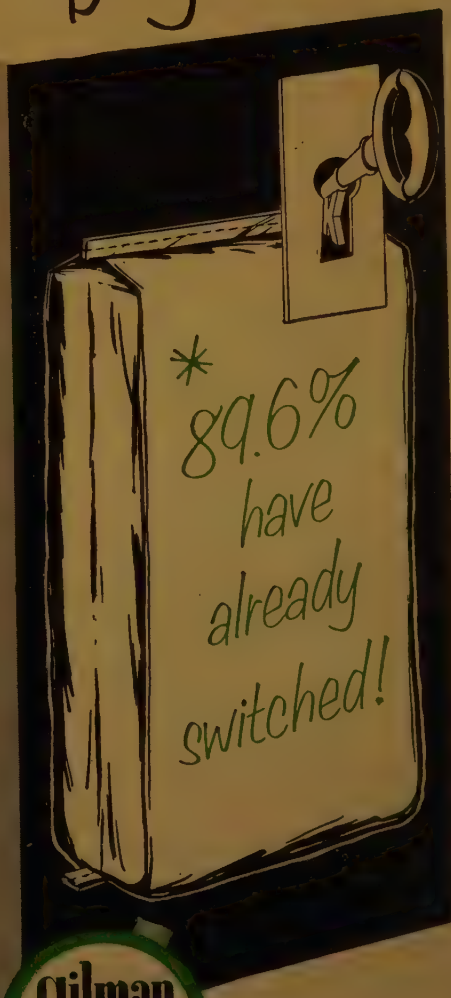
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National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, exec. sec.

National Plant Food Institute, 1700 K St., N.W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

American Potash Institute, 1102 16th St., N.W., Washington 6, D. C. H. B. Mann, president.

American Society of Agronomy, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary. Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C. William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn. Jack Criswell, executive vice-president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Pesticide Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Room 213, Ochsner Building, 719 "K" Street, Sacramento, Calif.

Chemical Specialties Manufacturers Association, 50 East 41st St., New York City. Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C. R. H. Nelson, secretary.

National Fertilizer Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, P. O. Box 9905, Memphis, Tenn.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, exec. sec.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

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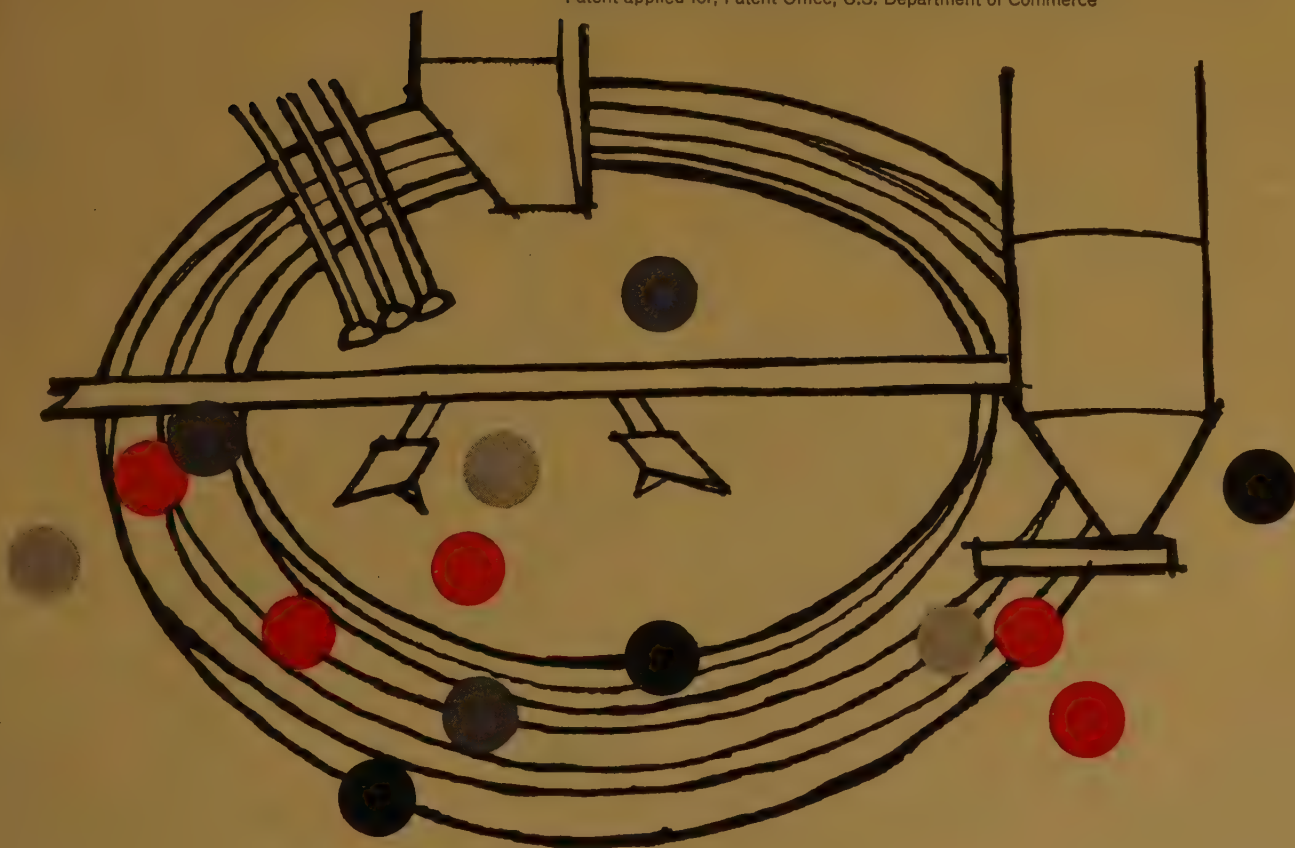
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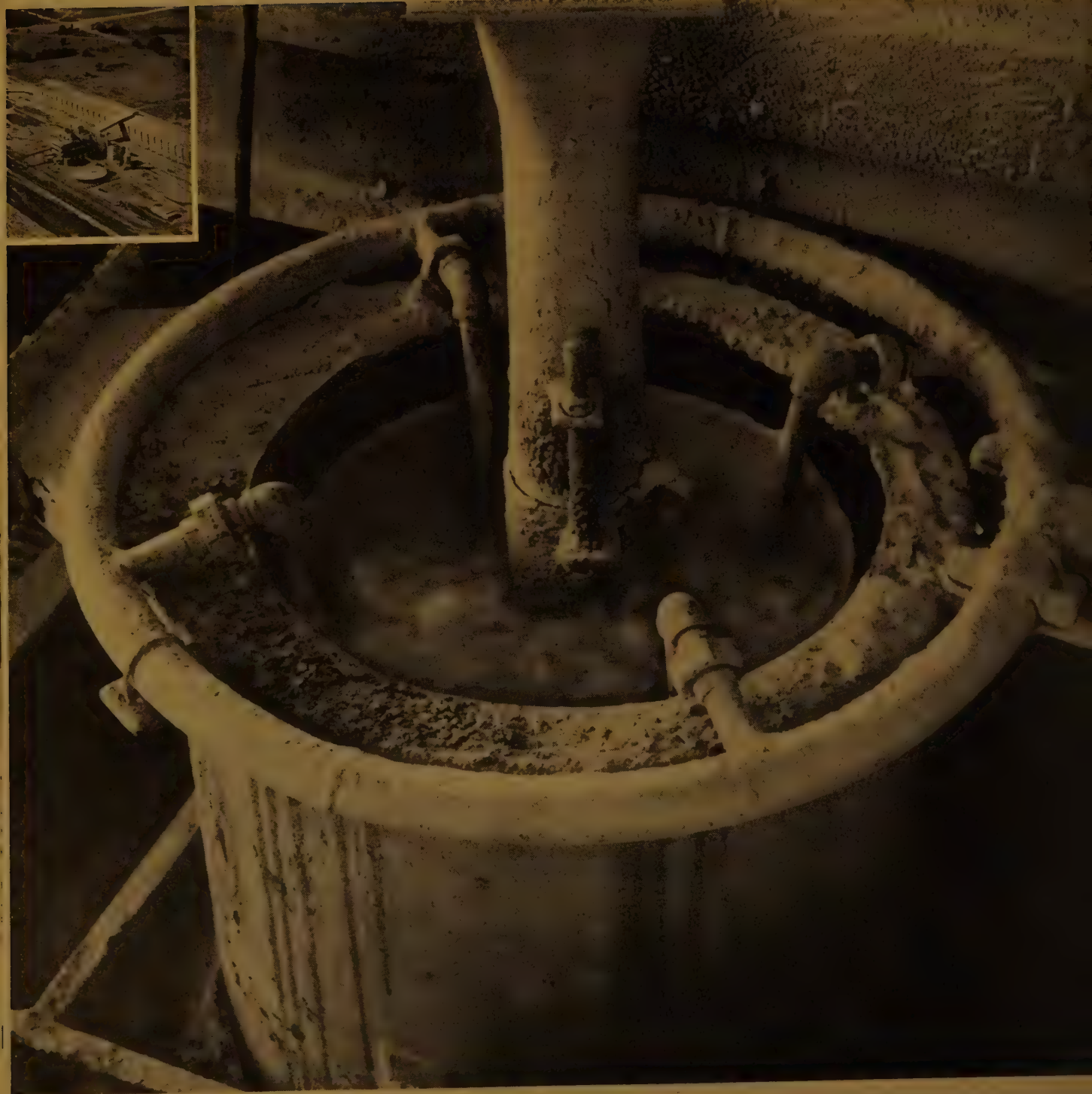


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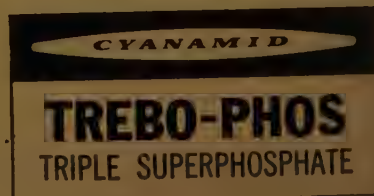
North American Agent and Demonstration Plant: William Houde, Ltd.
La Prairie, Quebec, Canada

IT ALL COMES DOWN TO THIS CRITICAL POINT

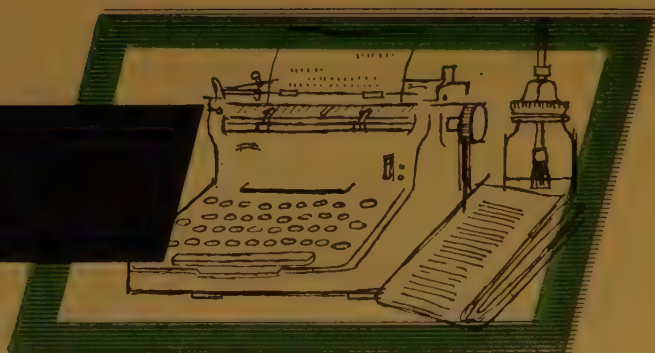


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EDITORIALS



IT is increasingly apparent that there has been a veritable revolution in fertilizer manufacture over the past ten or fifteen years. And we are not referring at the moment just to the big increase in use of anhydrous ammonia, nor the strides made with liquid fertilizers, but rather to the new production techniques that have been introduced in the manufacture of solid fertilizers which still, of course, account for well over ninety five per cent of all the fertilizer used.

In the manufacture of the conventional solid forms of fertilizer the big changes have been the widespread adoption of granulation, the trend toward high rates of ammoniation, and the swing toward more concentrated raw materials for use in the production of higher analysis finished products. It is in these directions that the most progress has been made over the past ten years, and the firms that have been alert to the changing technology have shared most widely in the continually expanding fertilizer market.

But, we were reminded forcefully by a speaker at the recent control officials meeting in Washington, it is not enough simply to follow the swing toward granulation, high ammoniation and high analysis products. Old and outmoded materials handling procedures and plant house-keeping practices must also be carefully studied and brought up to date. Unless they are, potential profits can readily be dissipated through a series of leaks which include: loss of nitrogen in mixing, overformulation to guarantee meeting grade, sloppy raw material handling, leakage in raw material lines, failure to collect valuable dusts, and overweight in the fertilizer bag. And, sad to say, every move to a more concentrated and higher priced raw material automatically in-

creases the sums that can vanish down these potential rat holes.

To be specific, dust collection today is a "must" in continuous manufacture of granular fertilizers. Without it, profits go "up the flue" actually and physically as well as metaphorically. Another speaker at the control officials session observed that fertilizer plants are currently spending more money for the installation of dust collecting equipment on dryers than the prewar cost of an entire mixing unit.

If such loop holes as those described are stealing the profits from *your* fertilizer operations, an early and close study of the subject is strongly indicated. This topic has been discussed by participants in the Fertilizer Industry Round Table, and the recommendations of these practical technical experts in fertilizer manufacture clearly signal the urgent need for closer controls on materials and more efficient plant maintenance all along the line.

A STRONG note of disagreement was sounded by one of the speakers at the recent NAC convention with the policy of some of the basic manufacturers of pesticides of by-passing their historical distributional outlets and carrying more products direct to the user. "I do not believe," said this speaker, "that there is any area of the chemical industry where the strong local or regional organization fits better into the marketing scheme than in the distribution of agricultural chemicals. I believe that strong local formula-tor-distributors will always be able to give better service than their national and larger competitors. They are closer to the market and are

(Continued on Page 106)

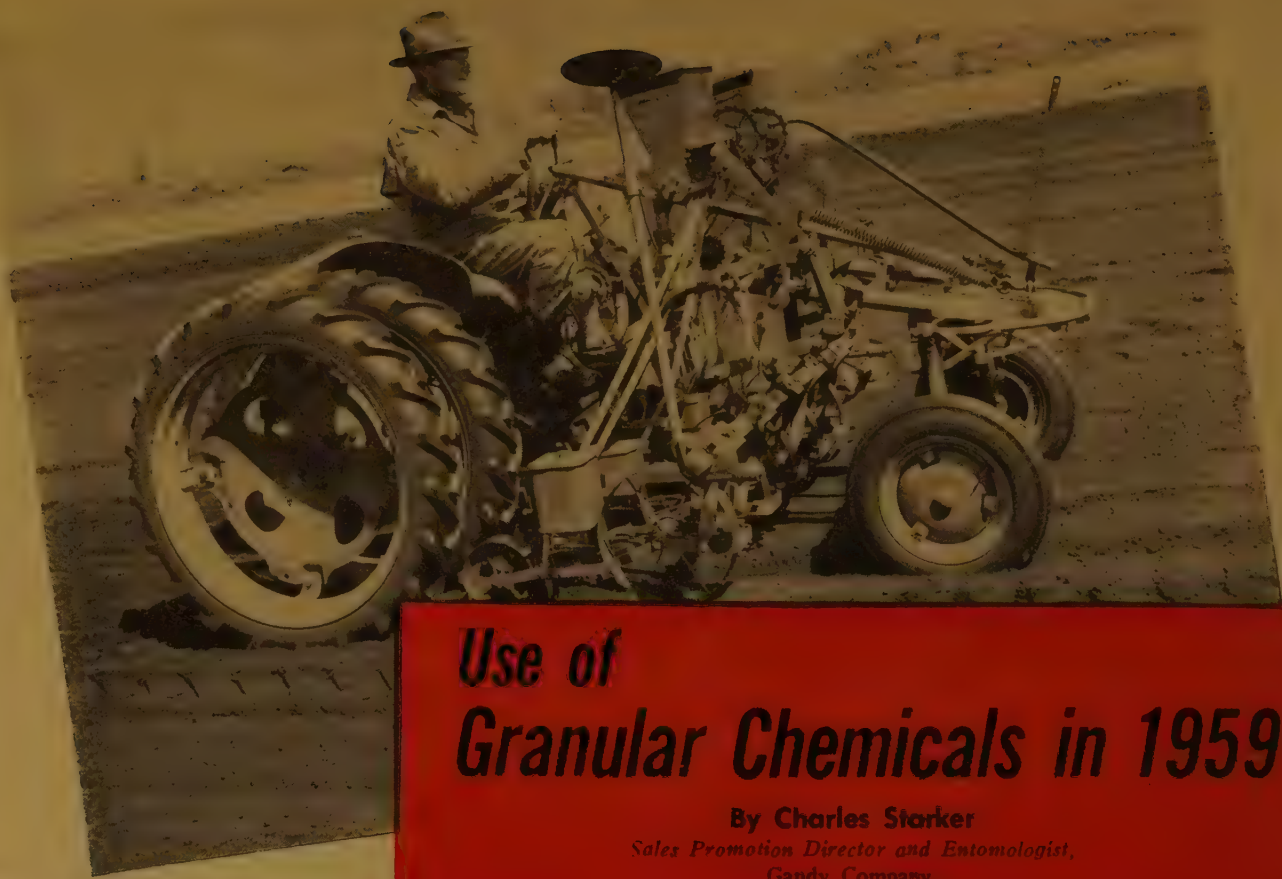


Figure 1. Qnion Planter Set-Up showing tractor with two granular applicators used in conjunction with individual Planet Junior seeders.

Use of Granular Chemicals in 1959

By Charles Storker

Sales Promotion Director and Entomologist,
Gandy Company,
Owatonna, Minn.

THE year 1959 marked a new era in the sales and use of granular pesticides. While granular soil insecticides have been in general field use in the Corn Belt for a number of years, it was not until this season that the use of herbicide and certain insecticide granules became wide-spread. Credit for this activity should go to the agricultural chemical industry, to the manufacturers and distributors of granular application equipment, and to research and extension personnel of the state colleges.

Interest in granular herbicides in the corn belt also stimulated growers to consider the purchase and use of granular applicators for soil insecticides as an "in-row" application at planting time. In several states in the mid-west, the sales volume for granular soil insecticides was three times that of last year, — and farmers who used granular aldrin or heptachlor in the row at planting for the first

time secured many unexpected benefits in yield increases, and in greater ease of harvesting — especially in areas where continuous corn culture is practiced.

Why Granules?

GRANULAR formulations of pesticides are much easier to use than spray materials. No water is required. The hauling and handling of water for spray equipment has always been a difficult and time-consuming job, and in some areas so much water was required for herbicide application, that farm wells ran dry attempting to supply it. With many herbicides, granular formulations are equal in action to the same amount of technical chemical in spray form; in the case of the more volatile materials, granular formulations are more effective. The use of granular pesticides reduces the possibility of skin irritation, and exposure of personnel to toxic compounds.

Granules are pre-mixed, ready to use, and eliminate "guess work" on the part of the user. Application equipment for granules is simple in construction, easy to use, low in cost, light in weight, and eliminates the need for bulky water-tight containers, pumps, strainers, hoses and pressure gauges. Plugged nozzles are no concern of the granule user. Granules are faster to use. It is necessary only to dump them in the hopper of the Row Crop Applicator, set the rate gauge and plant.

The use of granular forms of certain chemicals reduces the hazard of drift to susceptible crops, where this would be a problem with spray or dust applications of the same compound. The pesticide, when placed on the granule, tends to remain active longer than would be the case in dust or spray formulations. This generally produces a more favorable release of the toxicant, in regard to control

of the insect or weed. Granular formulations for a specific control job weigh less than the same amount of chemical in spray form. Thus for the control of wireworms or white grubs in the row, on corn, 5 lbs. of granular heptachlor or aldrin would be needed, while a spray application of either of these materials calls for a minimum of 2 gallons of diluted solution per acre (5 lbs. of granules vs about 16 lbs. of spray). Granules are also easier to haul and handle, and require less manpower than spray chemicals.

Pesticidal chemicals have a "built-in" chemical selectivity. When used in granular formulations, we take full advantage of the chemical selectivity and add to it the additional benefit of "physical" selectivity. Thus granular formulations of pesticides may be used on growing crops to control harmful insects or weeds present on the soil surface. In this way, none of the chemical or only a very minute

amount is deposited on the crop itself. This type of use is especially promising on vegetable crops. On onions, for example, Randox granules can be used at the 3-leaf stage, . . . on the other hand, a spray application of the same material would cause injury at this time.

Even under unfavorable conditions, herbicide granules give more soil coverage with less leaching and evaporation than do spray applications; granules may be measured more accurately and will not freeze in storage. Granular pesticides have less potential hazard to livestock and beneficial forms of insect life than other types of formulations.

Granules on Onions

ONION growers in many sections of the United States and Canada were faced this season with a strain of resistant onion maggot. Extensive field tests by experiment station workers in several areas of this country indicated that

certain phosphate insecticides could be relied upon to give commercial control of this pest, if applied at planting time. However, the application of phosphate materials brought up some rather unique problems. To be effective on many soil types, phosphate materials must be in a concentrated form, otherwise they are inactivated. Phosphate insecticides also pose a greater toxicity hazard than do some pesticides used formerly by onion growers. By using a granular phosphate formulation, this personal exposure is cut to a bare minimum and effective concentration of the chemical can be maintained. The next problem was how to apply these granules in proper quantities and to the proper soil area in relation to the onion seed or set. The Gandy Granular Chemical Row Crop Applicator (fig. 1) was found to be well suited for this purpose. As a result of the resistance problem in onions, growers in many areas of this country and Canada used quantities of granular pesticides for the first time this season. This same applicator, with a suitable attachment, could also be used for making applications of granular herbicides, to onions, either during planting, or at the three-leaf stage.

Systemic Insecticides

ANOTHER group of phosphate insecticides include the systemic materials Thimet and Di-Syston. Granular formulations of these compounds were used experimentally on a number of crops throughout the United States. Thimet was marketed on a commercial scale in several states this past season for use on potatoes at planting time.

Granular Herbicides

FROM the sales standpoint, granular formulations have tremendous appeal to the user. Apparently farmers are more concerned about weeds in corn and soybeans than they are about insect damage. (Possibly this is because they can see the weeds). Present



Figure 2. Rear view of 4-row McCormick 450 Planter with two Gandy 901-4W Herbicide applicators attached. Each applicator covers two rows. Twin "Ro Banders" apply a 14 inch band of granular herbicide over each row.



Figure 3. Close-up view of portion of 4-row Minneapolis-Moline PQ 400 planter, showing tandem hook-up of Gandy 901-2 (soil insecticide) and Gandy 901-4WT (granular herbicide) applicators. With this combination on his planter, the farmer can plant his seed, apply the starter fertilizer, apply a granular soil insecticide "in the row", and apply a 14 inch band of granular herbicide over the row—all in one operation. These applicators will fit all popular makes of planters.

dications are that maximum use of granular herbicides will be at planting time as pre-emergent applications. The application of granular herbicides is greatly simplified by use of granular chemical attachments which can be mounted readily on popular types of row crop planters. (figure 2).

In the Mid-West, corn and soybeans were two crops for which granular herbicides were first marketed this season. On corn, four granular chemicals were available: Eptam 20% (Stauffer); Radox 20% (Monsanto); Iso-octyl-ester of 2,4-D 20% (Reasor-Hill), (Diamond Alkali), (Riverdale); and Imazine 4% (Geigy). On soybeans, Radox 20% (Monsanto); Chloro IPC 5% and 20% granules (Columbia-Southern) were available.

While a few growers applied these granules broadcast, most used a row crop applicator on their planter and applied the granules in a 14-inch band over the row. Where this latter procedure was followed, rates of chemical needed per acre (on 40 to 42 inch rows) were $\frac{1}{3}$ that required for a general broadcast application. Grower cost per acre for band treatment with granular materials varied somewhat with location, however the following approximations are fairly accurate:

Soybeans: Radox 20% (5 lbs.) \$3.25
Corn: Eptam 20% (5 lbs.) \$4.20
Radox 20% (7 lbs.) \$4.65
2,4-D 20% (5 to 7 lbs.) \$1.65 to \$2.31
Imazine 4% (17 to 34 lbs.) \$7.65 to \$15.30

Granular Soil Insecticides

"N-ROW" applications of granular aldrin or heptachlor have become increasingly popular due to the availability of granular row crop applicators which are attached directly to the planter. With a Gandy applicator, both insecticide and herbicide applicators may be attached in tandem to the planter. This allows the operator to plant his crop, apply starter fertil-

izer, soil insecticide, and pre-emergent herbicide all in one operation (see figure 3). Mid-west farmers who purchased new planters in the last few years have found that the "split-boot" method of applying starter fertilizer has been replaced with an attachment built into the planter, which puts the fertilizer where it may be used more effectively by the crop — to the side of, and below the seed. While insecticides mixed with starter fertilizer were of considerable benefit when applied with the "Split-Boot" type of planter, this combination when used in the new planters is ineffective for soil insect control. "In-row" applications of granular soil insecticides were found to be the most practical, effective, and least expensive method, where such applications were made with an accurate granular chemical row crop applicator. When used on corn, cost for insecticide granules is about 25% less than buying insecticide incorporated with starter fertilizer (the old "split-boot" method). While granular soil insecticides may also be broadcast, this type of application is rather expensive, especially when corn is grown in rotation with other crops.

Other Uses For Granular Pesticides

THUS far we have considered chiefly the use of granular formulations on onions, corn and soybeans. Radox granules and Eptam granules were also used on several other crops this past season with good results. Chloro IPC is recommended for use on quite a few crops we did not mention.

A number of different granular insecticides are recommended for the control of European Corn Borer on corn. Granular soil nematocides have also been used on a number of crops prior to planting, and this usage is increasing.

What About Application Equipment?

THE efficiency and utility of any pesticide is determined in large measure by the type of application equipment available.

In the case of granular pesticides, the Gandy Company has pioneered the development of precision application equipment. The present Gandy Granular Row Crop Applicator is the end result of basic work done some 23 years ago by Mr. E. S. Gandrud, then a County Agent, in developing a device to safely spread dry sodium chlorate for bind-weed control. The precision metering feature of this original spreader was "built in" to the first Gandy row crop applicator which was designed to make "in row" applications of granular soil insecticides based on work done at Ames, Iowa by Dr. J. H. Lilly. An improved form of this applicator has been marketed by the Gandy Co. for the past six years. During the 1958 planting season, one pesticide manufacturer had limited quantities of granular 2,4-D he wished to test on corn. He needed a specific device to distribute this herbicide uniformly on the soil surface. Preliminary work done on this problem resulted in the present Gandy "Ro-Bander" which is made up of multiples of 7 inches, each Ro-Bander producing a band of that width. On certain crops, such as onions and sugar beets, a 7 inch band appears to be adequate; while on corn and soybeans, a 14 inch band is preferred — here twin "Ro-Banders" are used.

No doubt one of the factors which in the past has limited development and marketing of granular pesticides, and in particular the granular herbicides, has been unavailability of suitable application equipment. This situation has been remedied. At present, the Gandy company has distributors in the chief agricultural areas of the United States and Canada. These distributors, in general, sell to farm equipment stores or to pesticide dealers. The International Harvester Company markets Gandy applicators under the trade-name "IH McCormick Gandy" in both this country and Canada. A granular applicator is also made by the
(Continued on Page 115)

Screening and Classifying Fertilizers at Canadian Plants of International Fertilizers Ltd.

INTERNATIONAL Fertilizers Ltd. and their associated companies produce fertilizer in plants located in many parts of the world. The Canadian operation includes plants at Quebec City, Quebec and Saint John, New Brunswick, where fertilizers based upon ammoniated super phosphate, muriate of potash and ammonium sulphate are produced.

Studies at International Fertilizers, Ltd. revealed that the granulator yield could be increased with a corresponding decrease in costs, if more effective sizing of granulated materials could be developed. Conventional screening equipment required the use of oversize screens to overcome blinding tendency, but this reduced the yield by increasing the recirculating load. The problem was to find a high-efficiency classifier, with a limited space requirement that was capable of handling high tonnage.

In late 1955, pilot scale test

work was carried out using an 18" diameter Sweco demonstration unit. These tests confirmed management's opinion that both production rates and product quality could be improved by a more effective sizing of the granules. In March of 1956, a single deck 48" diameter Sweco* Fertilizer Separator was installed at the Quebec City plant. Depending on the grade of fertilizer being produced, a 14 mesh market grade stainless steel screen cloth with an opening of .0510, or a 12 mesh with an opening of .0603 is used. Sweco's special anti-blinding device which employs rubber balls that travel in unrestricted, random pattern beneath the screen cloth, was installed to eliminate screen cloth blinding.

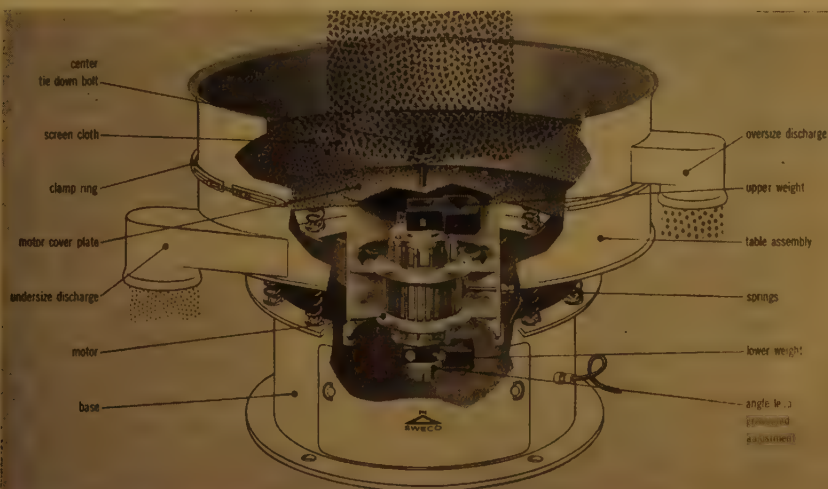
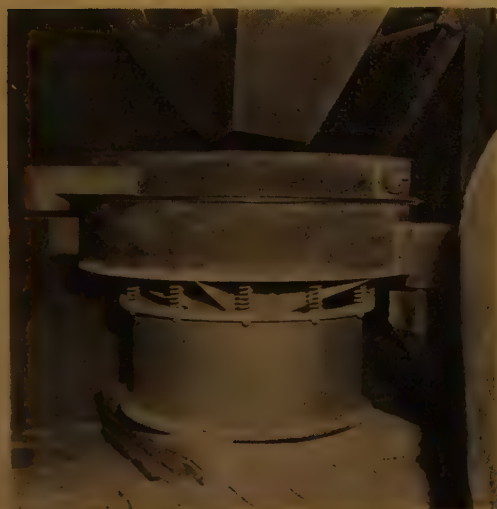
When employing the 14 mesh screen cloth, the Sweco unit accepts fertilizer weighing 65 lbs./cu. ft. at a rate of 9 tons/hr. The acceptable oversize material is delivered

from the Separator to a conveyor and then to storage or packaging. The fines, then completely free of the desirable product, are recycled to the granulator. The Separator has improved product quality, because particle size distribution is closely controlled. Granulator yield has been increased by 25% solely due to the efficient classification possible with the fertilizer separator. A significant reduction in nitrogen losses has been achieved by minimizing the recirculating load that tends to overheat the product.

Basically, the Sweco Vibro-Screen Separator is a unit that vibrates about its center of mass. Vibration is accomplished by two eccentric weights on the upper and lower ends of the motor shaft. Rotation of the top weight causes vibration in the horizontal plane of motion, which causes the material to move across the screen cloth to the periphery. The lower weight acts to tilt the machine, causing vibration in the vertical and tangential planes of motion. The angle of lead given the lower weight with relation to the upper weight provides variable control of the spiral screening pattern.

The Separators can be adapted easily to fit individual screening requirements. Speed and spiral pattern of material travel over the screen cloth can be controlled for maximum throughput of any screenable product: wet and dry . . . heavy and light . . . coarse and fine . . . hot and cold.★★

*Made by Southwestern Engineering Co.,
4800 Santa Fe Avenue, Los Angeles, Calif.



More Entomological Research Called for By Speakers At Insect Resistance Symposium

THE history and current status of the insect resistance problem was covered fully in the symposium "Research Progress on Insect Resistance", held Oct. 7 and 8 at the Mayflower Hotel in Washington, D. C. The increasing problems which are being encountered in all phases of pest control as a result of development of resistance were dealt with at length, but there were few actually useful concrete suggestions offered by the speakers leading to a solution of the problem.

The symposium was sponsored by a committee of the National Agricultural Chemicals Association and the Entomological Society of America. Dr. Robert L. Metcalf, U. of California, Riverside, was the chairman.

Research to provide substitute insecticides from year to year is not a satisfactory solution to the resistance problem, declared E. F. Knipling, USDA, Beltsville, Md. Dr. Knipling said that various approaches, depending on the insect and circumstances, must be developed. These, he said, should include chemical, biological, cultural, varietal, or a combination of these methods.

Federal and State institutions, Dr. Knipling said, probably are in the best position to assume major responsibility for the fundamental aspects of entomology which could point the way to probable solutions to insect problems, but the chemical industry also should conduct

and support more investigations of this nature.

W. E. Ripper, Dow Agrochemicals Ltd., London, England, one of the earliest exponents of wider use of selective insecticides, said that studies of the mechanism of the Darwinian selection which leads to resistance shows that the way to prevent this segregation of resistant strains is to destroy the survivors of a pesticide treatment by natural enemies of the pest. He said that there are a number of explored cases of the use of selective insecticides in which the scarcity of the food of the natural enemies caused by a decimation of the pests by the pesticide has led to such a concentration of the natural enemies' activity on the survivors of the pesticide treatment that the survivors were wiped out. Conversely, he continued, there are no cases on record where a selective insecticide, when applied against a pest which had natural enemies in the ecosystem, had not led to complete mopping up of the survivors, provided the insecticide was applied in the correct concentration.

If, Dr. Ripper concluded, the spread of resistant strains of insects which are under partial biological control assumes the status of a major problem, then it would make sense to readjust the research objectives of organizations responsible for the development of new pesticides to the discovery of selective insecticides, and so avoid the resistance, although selective in-

secticides might be higher priced than the broad spectrum pesticides.

The future direction of chemical control of insects undoubtedly will tend toward more and more specific methods and treatments, said George R. Ferguson, Geigy Agricultural Chemicals, Ardsley, N. Y. He said that even now there may be chemical tools available to handle specific problems, but the markets may be too limited to allow the economic expenditure of the sums required for clearance for use.

J. E. Johnson, Dow Chemical Co., Midland, Mich., said that future research should strive for insecticides with steep dosage response curves and formulations which minimize periods of high "selective pressures".

Preceding the above views on future research, the symposium delved into present resistance problems and current knowledge about the resistance of insects to insecticides. E. H. Glass, New York State Agricultural Experiment Station, Geneva, said that resistant strains of thirteen insect and mite species are known to exist on six species of deciduous orchard trees in the United States. In some orchards, he said, the practice of frequent changing from one pesticide to another, as new and better materials become available, has been observed to delay and perhaps prevent the development of resistance. Mr. Glass reported that certain investigators now are suggesting planned rotation of orchard pesticides.

R. K. Chapman, University of Wisconsin, Madison, said that, considering the large number of vegetable pests, relatively few have developed insecticidal resistance, but these resistant insects constitute the most pressing problems in vegetable insect control at the present time. Although the prediction of the development and spread of resistance is extremely difficult, it is believed by Mr. Chapman that, by a study of the biology, habits, and insecticide control program being used, at least some educated guesses can be made in this respect.

By 1958, 16 species of insects and spider mites attacking cotton were known to be, or were strongly suspected to be resistant to pesticides, according to H. G. Johnston of the National Cotton Council, Memphis, Tenn. Mr. Johnston said, however, that, on a short-range basis, cotton pest resistance is being handled satisfactorily by changing to alternate chemicals with different modes of action.

John S. Roussel, Louisiana State University, Baton Rouge, La., said that current resistance studies with the boll weevil utilize techniques which eliminate diapause as a confounding factor in determining levels of resistance. He said that the studies were undertaken to determine the response of boll weevil populations to the chlorinated hydrocarbon insecticides after several years of limited usage, and to the organo-phosphorus insecticides which have been used recently. The possibility of reversion to susceptibility in areas where the organo-phosphorus insecticides have been used for several seasons is being considered, Mr. Roussel said.

Resistance in pests of livestock and poultry is not yet such an acute problem in the United States as it is in other sections of the world, but it is increasing each year, according to W. C. McDuffie, USDA, Kerrville, Texas. Reports have indicated, Mr. McDuffie said, that the chlorinated hydrocarbon insecticides are not now as effective as they had been, and resistance is suspected but not definitely proved in the stable fly, horn fly, and primary screw-worm fly, cattle lice, and poultry mites. He said that most of the resistant species can be controlled with organic-phosphorus insecticides, but several species of mosquitos and the house fly already have become resistant to this class of insecticides.

There is strong evidence that parathion-resistant mite colonies of *T. telarius* originated in four greenhouse establishments and became widely distributed through plant sales. This was reported by Floyd F. Smith, USDA, Beltsville, who

said that one resistant colony exposed to no miticide for ten years has retained its resistance.

Agricultural entomologists are considerably behind their colleagues in the field of public health in determining levels of insecticide resistance among pest arthropods, declared Harold T. Reynolds, U. of California, Riverside. This is particularly true, he said, as regards standardization of techniques. Actually, Mr. Reynolds pointed out, numerous reports of resistance are received, but many of these are based on repeated control failures in the field rather than on precise, definitive laboratory tests.

To date, he said, most laboratory workers have relied to a large extent upon their ingenuity in devising techniques to establish resistance levels. He said that it is desirable, even essential, that techniques be standardized, so that other workers, now and in the future, will be provided with familiar and more helpful information as they work with similar methods. The results, he continued, would provide a reference point in the future when it is conceivable that unexposed strains cannot be found. Certainly the literature would not be cluttered with as many variations in techniques as there are reports, Mr. Reynolds declared.

Other speakers on the program discussed the genetics and biochemical aspects of resistance in insects. C.W. Kearns, U. of Illinois, Urbana, said that a pattern of investigation gradually is developing

which encourages the hope that a solution to the problems of the mechanism of action of insecticides eventually will be clarified to a much better degree than at present. Out of this, he said, should come some of the answers we need to cope with the resistance problem and it should also result in a marked improvement in the techniques we have for discovering new insecticides.

Ralph B. March, U. of California, Riverside, reported that organophosphorus resistance in the house fly differs significantly from chlorinated-hydrocarbon resistance, but only more complete and exhaustive studies will show whether or not any of the differences can be exploited.

The principal causes for the resistance phenomenon have been shown to be changes within the insect which may occur spontaneously upon contact or be genetically derived through a continuous process of selecting out the most tolerant individuals in a given population, according to H. H. Moorefield, Boyce Thompson Institute, Yonkers, N. Y. He said that no evidence has been obtained to indicate that the carbamates can induce an immediate physiological change of susceptibility in any of a group of insect types. In his discussion of resistance to carbamate insecticides, Mr. Moorefield said that carbamates that are less effective fly toxicants readily produce resistant progeny within a few generations.★★

"Substitute insecticides are not a satisfactory solution to the resistance problem"

E. F. Knipling

"The future direction of chemical control of insects undoubtedly will tend toward more and more specific methods and treatments"

G. R. Ferguson



Bill Chadwick and Bill Dible, both of IMC, enact a skit on sales.

SELLING Fertilizer

B. M. Surgent, IMC; W. Angstadt and R. Kurtz, both of Read-Bone Fertilizer Co.



Neal Schenet, IMC manager of merchandising, marketing division. Below: general view of IMC sales clinic in Baltimore.



PLANNED SALES — WHAT YOU NEED TO KNOW

Professional selling requires the careful planning of how the sale is to be handled, and then the carrying out of that plan through your planned action making the sale.

The fertilizer salesman who does this is performing a Full Orbit Selling job, by *putting and keeping the sales in orbit*.

A first approach to the plan is to know your customer, his needs, his reasons for buying or not buying fertilizer, his attitude toward the use of fertilizer*.

Buying motives are based on feeling, reason, or a combination of both. Some of the important buying motives are:

BASED ON FEELING	BASED ON REASON
• Ambition	• Lower Production Cost
• Prestige	• Greater Yield
• Pride	• Greater Profit
• Fear	

More Business

From Present Customers

Most farmers are not being sold on the need for adequate amounts of fertilizer. The annual average expenditure by individual farmers is estimated at \$700 to \$1,000. Only a small number of farmers are using anywhere near the amount of fertilizer necessary for maximum yield and profit . . . Many could double their present amount.

(In 1958, the IMC sales clinic concentrated on developing additional business from sources other than present customers. The 1959 program is directed toward showing fertilizer salesmen how to get more business from present customers.)

The following are some of the things *you* can do to build the sale of fertilizer to your present customers:

- **Soil Testing** — Get the farmer to let you or the dealer help him in making regular soil tests to determine his soil needs.

- **Farm Demonstrations** — Demonstrate what fertilizer programs have done for others, through test plots (on his farm or a neighbor's).

- **Success Stories** — Tell your customer about experiences of other farmers in his area, or under similar conditions.

- **Recommendations of Authorities**— Bring to customer's attention magazine articles, experiment station results, etc.

- **Credit Assistance** — Help the customer obtain necessary credit. (IMC offers a booklet on Credit Assistance, with details on this approach).

- **Record Keeping Assistance** — This consists of setting up a system for the farmer to keep a record of fertilizer applications to each plot.

- **Economic Benefits** — Spend time with the farmer discussing his problems and offering suggestions for increasing yields, lowering costs.

- **Follow-Up** — This should be simple, — but many salesmen don't do it. Your customer likes to know you are interested in his results. This is the time to do the planning for continuation of his fertilization program.

Use Soil Testing

The principal asset of the farmer is his land, — No other capital investment can be increased in value for such a small cost as his land — merely by proper use of fertilizer. But how many of your farmers know the fertility value and condition of their land? How many of *you* know the condition of your customers' soils?

You will first have to determine your customer's attitude toward soil testing. The emotional attitude of some farmers is that you are trying to sell him more fertilizer at a higher cost — Your approach must be one of showing him the benefits. Show him proof that *higher yield will lower costs*—

*IMC cites the National Plant Food Institute survey on the general attitude of farmers—his motives, education, progressiveness, etc. The survey was reviewed in *Agricultural Chemicals*, 1958.

Explain break-even points. — What happens when prices slump.—When there's a drought. In each case of course, more fertilizer rather than less is the farmer's insurance, or actual profit.

In summary, — get out in the field sometime and be sure the sampling is done correctly. Study the results and recommendations,— and *take them out to the customer*. Don't mail them. Work out a fertilizer program with him, and keep records of what happens.

Using Credit to Get Sales

How do you make credit work for you?—Remember that fertilizer doesn't cost the farmer — it pays. For every \$1 invested, there is a \$4 return! An analysis based on the NPFI survey showed that if the credit barrier could be eliminated, farmers would use 67% more fertilizer.

There are several actions which can be taken to make credit a sales tool: Establish a continuing relationship with the bankers and lending agencies in your locality. If the banker does not understand the economic role of a good fertilizer program, it will do no good for your customers to apply for loans. If it will help, get your local county agent to make a call on the banker with you. Stress return per dollar investment for the farmer, — show what you are doing to aid your customers.

Sales and credit go together. The farmer today can't stay in business nor can his business grow without the correct use of credit. Begin to use credit as a tool to get sales for yourself.

ORGANIZING YOUR INFORMATION PLANNING YOUR SALES

Having studied all the above factors, you are ready to plan what to do in your face-to-face selling situations. To keep your sale in orbit, it is necessary to follow a planned course of action.

If you can't take time to prepare a planned sale — just forget it! You'll never prepare a planned

Two forms suggested for the planned sale. (Right) Customer/Prospect Information Sheet (Left) Customer/Prospect Planning Sheet.

The forms illustrated are designed for the farmer customer. A similar set of planning forms are suggested for the dealer prospect/customer.

presentation while you're driving out to see the prospect.

We suggest two forms, which if prepared fully, will result in a planned sale. One is the *Customer or Prospect Information Sheet*—the other is a *Customer or Prospect Planning Sheet*. Examples are shown above.

The purpose of the *Information sheet* is to provide you with the important information you should have about the farmer or

dealer in order to prepare and conduct a successful sale. The *Planning sheet* is designed to help you get down in writing the objectives, the buying motives, the benefits to sell, the sales tools to use, objections which might be raised, — and how you intend to open and close the sale.

Of course the sale won't follow your plan exactly, — you will no doubt have to make some
(Continued on Page 101)

IMC FERTILIZER SALES TRAINING CLINIC

INTERNATIONAL Minerals is in the midst of its 1959 sales training clinic, which it introduced in 1958 as part of its Full Orbit Customer Service program. The 1959 clinics are being held in Kansas City, Shreveport, Atlanta, Tampa, Baltimore, New York, Columbus, Indianapolis, and Minneapolis, and will be completed by November 13th.

On the facing pages is a condensed version of the training clinic. Visuals, skits, movies, audience participation are utilized to "reach" attending fertilizer members.

Careful planning and presentation of the clinic resulted in active participation of many of the fertilizer salesmen attending the meeting. Case studies are analyzed by the audience, with suggestions on how to make the farmer a customer, — how to make the sale. Countering the sales approach, parti-

cipants are urged to think of the farmer's arguments, to parry the salesman's suggestions, and offer arguments for not buying fertilizer. These arguments are reviewed, facts and figures presented showing why "fertilizer pays!"

Participating in presentation of the 1959 IMC fertilizer sales training clinic are: William Dible, William Chadwick and Neal Schenel. This group of IMC executives works with the regional or district manager of the respective area in which the clinic is held.

IMC regional sales managers are: F. C. Broadway, W. W. Chadwick, G. W. Kramer, J. K. Lindsey, and G. J. Urbanis.

District Sales managers are: J. L. Baskin, G. L. Boynton, T. A. Bruns, W. S. Dennis, J. H. Drewry, H. C. Dyer, R. V. Falck, R. A. Heuerman, H. W. Hoffman, W. E. Lane, M. S. Malone, and B. M. Surgent.

PUBLIC relations and legislation are two areas threatening to further complicate the pesticide industry's future, advised Jack V. Vernon, vice president of Food Machinery and Chemical Corp., and president of NACA, in his address before the 26th annual meeting of the National Agricultural Chemicals Association, held October 21-23 at the French Lick-Sheraton Hotel, French Lick, Ind. Both problems were further reviewed in addresses by industry and government experts, while the more immediate questions of selling pesticides and making a profit were considered by other speakers from the industry.

Some 400 members and guests of the pesticide industry heard Robert S. Thompson's views on the sales and marketing of pesticides. Mr. Thompson asserted that one of the biggest steps forward in marketing practices in recent years has been the elimination of consignment selling in the north central part of the U. S. He added that obviously the seller must get an adequate profit margin, if he is to be able to promote the industry's products aggressively to the end user. The full text of the address by Mr. Thompson, who is president of Thompson-Hayward Chemical Co., Kansas City, appears on pages 41-43 of this issue.

Louis Czufin, California Spray-Chemical Corp., in discussing the advertising and promotion of pesticides cited the statement, "the surest way to overspend on advertising is not to spend enough to do a job properly." (Mr. Czufin's report appears in full on pages 46 and 47 of this issue).

Pesticides sales have been good this year, announced Jack Vernon, in his report. He observed that dollar volume will probably be

- **NATIONAL AGRICULTURAL**
- **CHEMICALS ASSOCIATION**
- **RE-ELECTS J. V. VERNON**
- **PRESIDENT FOR 1960**

higher than the \$265 million dollar total, at the manufacturer's level registered in 1958. He added also, "there appears to be some improvement in the return on assets that companies in the industry employ."

However, "as an industry, we are still plagued by a costly and excessive inventory problem. We suffer from the burden of oversized accounts receivable. From an investment viewpoint, these are the major factors that influence our return on invested capital."

Mr. Vernon cited several other problems confronting the industry. From a profit viewpoint, he noted that tremendous expenditures are needed for research and development, and that the great majority of basic pesticides have had price declines in recent years, while prices of other materials have increased drastically. "If the two components of the return on investment equation are applied to our industry," stated Mr. Vernon, "we must immediately recognize the fact that our's is a low return operation. High investment—low profits." It is stating the obvious to say that

our industry falls into the high risk category.

During the past year, continued NAC's president, the problems of public regulations and legislation have grown in magnitude to the point that they now fall in the urgent category. Attacks on agricultural pesticides by various interests have mounted. Among those that have been outspoken in criticism are some wildlife groups, conservation groups, organic gardeners and various other food faddists. And stemming in no small measure from the attacks on pesticides is the problems of legislation at Federal, State and local levels.

Mr. Vernon pointed out that NACA has made sincere efforts to develop among wildlife people a better understanding of industry's responsibilities, and the vital role its products play in our total economy, and in advancing public health. "I do not think we have made much more than a small beginning, certainly there is room for much more improvement. Meanwhile, attacks of some wildlife groups continue unabated."

Panel participating in discussion on Pesticides and Wildlife: Moderator, Jack Dreessen, NAC; Charles H. Callison, secretary National Wildlife Federation; Clarence H. Hoffman, USDA, ARS, Entomology Research Division; Walter W. Dykstra, U. S. Fish and Wildlife Research; and Charles Lincoln, head department of entomology at University of Arkansas.



As to the other related problem, on the legislative front, Mr. Vernon observed, "This problem has been growing over the years; the outlook is for more rather than less legislation in the foreseeable future." NACA, representing the pesticide industry, has built a solid record of initiating and working for the enactment of sound pesticide legislation at Federal, State and local levels. Today, however, NACA and industry are confronted with a growing pile of bills which promise, if enacted into law, to cripple society's age-old warfare against insects and other pests.

"We will find it necessary in the future to give increasing attention to the trend toward more and more public or semi-public projects for the control of pests."

Mr. Vernon also pointed to still another, although long standing problem, which needs attention,—the paucity of industry statistics. Ultimately, he said, we must gather this data and put it to use on behalf of industry. The decision, of course, rests with the membership and not with NACA.

"In order to accomplish the additional work that must be done, additional personnel and funds must be made available to NACA. We as an industry cannot afford to put aside the problems confronting us as not important,—for they are. We must cope with them." Mr. Vernon concluded his comments with the observation, "All of us have the opportunity to share in the larger volume of business ahead, provided we plan it wisely now, and move intelligently in the future." Furthermore, unless the

Public Relations . . . Legislation . . .

Two areas where pesticide industry faces a serious threat to its future

Jack V. Vernon, Food Machinery and Chemical Corp., was re-elected president of NAC at the annual board meeting. George R. Ferguson, Geigy Agricultural Chemicals, was elected vice president.

Three new members of the Board of Directors were also elected: John A. Field, Union Carbide Chemicals Co.; Paul Mayfield, Hercules Powder Co.; and Herbert F. Tomasek, Chemagro Corp.

problems in the areas of public relations and legislation are resolved or alleviated, too much of

the time of all of us in the future as in the past is going to be dissipated in defensive measures.

Pesticides and Wildlife Panel . . .

JACK Dreessen of the NAC staff moderated a panel discussion on Pesticides and Wildlife. Walter Dykstra of U. S. Fish & Wildlife Service led off by pointing out that this agency does not oppose nor become involved in pest control operations except as they infringe on its obligations to protect the

country's fish and wildlife resources. They take the position that the need for pest control should be clearly demonstrated, and that the programs adopted should be those which entail least danger to all forms of life other than the specific pest toward which control is directed.

He reported on 1958 studies of quail mortality in a treated area in Alabama. Two weeks after spraying (at a 2 lb. rate) there was an 87% reduction in quail population in the sprayed area. However he indicated that only 17% of the missing birds were recovered as carcasses and it was uncertain as to how many might simply have left the sprayed area. By the following spring the population had made a substantial recovery, but

Left photo: Speakers at opening session of NAC meeting. Louis F. Czufin, California Spray Chemical Corp. General Committee Chairman, Roger Roth, Velsicol Chemical Corp.; and Robert S. Thompson, Thompson Hayward Chemical Co.

Right Photo: NAC guest, Dr. George Decker, Illinois Natural History Survey; Lea Hitchner, NAC executive secretary; and Dr. Charles Palm, dean College of Agriculture, Cornell University, who discussed World Pest Control Developments at final NAC session.





Reporting on the new law P.L. 86-139, Justus C. Ward, USDA, Plant Pest Control Division addresses NAC members at podium. Seated center are: Joseph Noone, NAC staff, and George Ferguson, Geigy Chemicals, newly elected vice president.

it was still reported to be 30% under the pre-treatment level.

The Fish and Wildlife Service, he observed, are more concerned about possible long-term effects from spray programs rather than immediate kills. If the area treated is not too large, repopulation normally restores the balance. But possible interference with reproductive capacity of sprayed birds, resulting in a long-term population drop, is a consideration which the Service is attempting to study in work which is continuing.

Charles H. Callison, secretary of the National Wildlife Federation, emphasized that the public interest in wildlife resources is great, and added that "the bureaucrat or the single-track scientist who thinks he can write off a kill of wildlife caused by an insecticide as a matter of no importance, is making a grave political mistake." Commenting on the refusal of the Alabama legislature to appropriate any funds this year for the fire-ant control program, he suggested that residents of the state recognize the fire ant merely as a nuisance, a pest to be sure, "but one that surely can be handled in some practical manner without decimating wildlife resources." He observed that Alabamans have been living with the fire ant for thirty or forty years and no disaster has overtaken them.

He levied a blistering attack against the whole Fire Ant Control Program, charging that "privately, good entomologists and research

men in Agricultural Research Service will tell you the fire ant program was badly conceived and has been badly run. But they won't say so publicly or for the record." He added that earlier this year the U.S.D.A. changed its earlier dosage recommendation, reducing the rate of application of dieldrin or heptachlor from two pounds to one and one quarter pounds per acre, but no publicity was given to the change. To announce such a change publicly, Mr. Callison suggested, "would be to confess error and to admit that sure enough, as critics had charged, the program has been started without adequate research and testing." The fire ant program, he concluded, "will go down as the classic example of how not to initiate an insect control operation."

Charles Lincoln, head of the department of entomology of the University of Arkansas, observed that short term studies of the toxicity of insecticides to any single animal cannot be counted on to shed real light on the problem, and that long-term studies of the effects of large-scale applications on the entire faunal complex are extremely expensive to conduct. The large scale use of insecticides for cotton insect control, the speaker indicated, affords an opportunity to study the effects of insecticide applications on a large scale over a period of years. In the delta section of Arkansas, where from 4 to 10 applications of BHC,

toxaphene, aldrin, dieldrin, heptachlor, endrin, phosphates, and calcium arsenate are made annually at varying rates, he reported, no long-term population trends traceable to insecticide usage have been detected. No evidence was disclosed of the possibility of the eradication of insects, either pest species or predators, from the treated areas. Drastic effects are often noted within the year in treated fields, but not from year to year or for the area as a whole. Repopulation from surrounding areas apparently restores the natural balance rapidly.

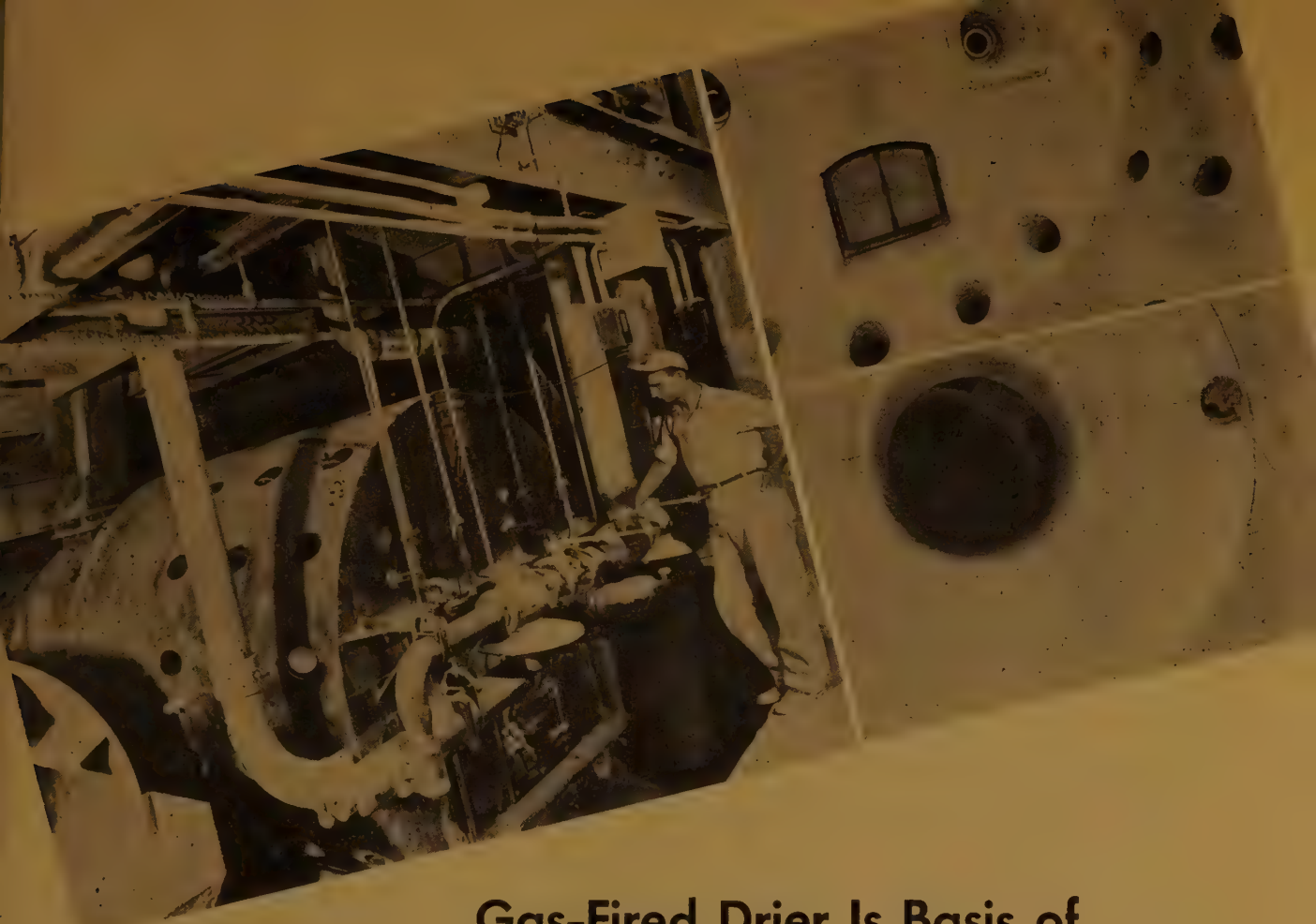
C. H. Hoffman of the Agricultural Research Service, U.S.D.A., observed that "a decision as to whether or not spraying is undertaken should be based on a fair appraisal of all interests." Some bird mortality inevitably results from spray programs to control the dreaded Dutch elm disease fungus, he noted, but, however regrettable, this must be weighed against the value of the trees, the cost of removal, the loss of bird habitat that will be inevitable if the trees are allowed to die, etc. "The reproductive capacity of birds," he suggested, "and their ability to inhabit new locations and to become re-established in sprayed areas should also minimize overall and lasting effects."

When an insect new to an area becomes a threat, he observed, an early decision must be made as to whether to attempt to eradicate it, to control it or to live with it. And, he reminded, "some dangerous insects that could have been eradicated at small cost when first discovered later have proved costly to control or live with."

HR-6436—How it Affects Industry

JUSTUS C. Ward, USDA, Plant Pest Control Division, reported on the impact of the new law, HR 6436 (P. L. 86-139), called the "Nematocide, Plant Regulator, Defoliant and Desiccant Amendment of 1959." There are only two vital factors to remember, he said:

(Continued on Page 104)



Gas-Fired Drier Is Basis of Fertilizer-Granulator at FMC

Left picture: This Sackett-granulator drier furnace used by Fertilizer Manufacturing Cooperative, Baltimore, is part of an automatic system capable of producing 20 tons of granulated fertilizer per hour. Hot gases are drawn from the furnace through 50-foot drier at 1100°F.

Top right picture: View of front wall of gas-fired granular fertilizer drier shows how monolithic refractory material forms single continuous piece, even around tempering air inlets.

Bottom right picture: As shown in this view of throat entrance to transition chamber and rotary drier, one piece construction of the lining eliminates joints and special shapes.

A GAS-FIRED drier, with a monolithic refractory lining, is the heart of the fertilizer granulator system now in operation at Fertilizer Manufacturing Cooperative, Baltimore, Md.

The system, designed by A. J. Sackett & Sons Co., Baltimore, with the aid of Albert Spillman, general manager of the Cooperative, was built at a cost of \$250,000. In full production, it automatically produces 20 tons of granulated fertilizer per hour.

According to Mr. Spillman, first step in the process is weighing the potash and superphosphates—the dry raw materials from which granular fertilizer is made.

"From the scales, the dry materials are discharged onto conveyor belts that lead to a vertical bucket elevator. This elevator carries the dry chemicals to a Sackett gravity mixer for blending," Mr. Spillman explained.

The blended material is then lifted from the mixer by a bucket elevator, and discharged onto a single-deck screen. Here, all foreign matter is removed. Over-sized material is sent back to the pulverizer to be ground and remixed.

At this point, a continuous operation begins. Dry mix is constantly weighed and fed into a T.V.A. ammoniator. This apparatus consists of a rotating drum with submerged pipes for the in-

troduction of nitrogen solutions, sulfuric acid, phosphoric acid and water.

"The wet mix comes from the ammoniator ready for formation into granules of acceptable product size," Mr. Spillman continued. "Our system employs a Sackett-developed Star granulator. In the granulator, a special arrangement of rolling trays vigorously tumbles and rolls the wet material until small pellets or granules are formed."

Next, the moisture-filled granular pellets must be dried. They flow through a chute from the granulator to a rotary gas-fired drier. A 15-million BTU-per-hour dual burner system feeds hot gases through the drier at temperatures up to 1100°F.

Pellets are case-hardened and dried to within 2 percent moisture
(Continued on Page 115)

THE problems which develop in the marketing of pesticides at the formulator level, are intimately associated with those of research, development, public relations and governmental regulation. The problems of a basic manufacturer today — the development, testing, clearance, production and distribution of a new pesticide — can be surmounted only by the strongest and best managed companies.

From a regulatory standpoint, there have been and still are, problems at the local as at the federal level. I don't know whether it will impress you, as much as it did me, but the magnitude of this problem on a national scale is brought home when we realize that it was necessary to review a total of 498 bills introduced in the various states during the 1959 legislative season which might directly, or indirectly, have an effect on the agricultural chemicals industry. One hundred and twenty-eight of these would have directly affected the industry to varying degrees. Direct NAC action was required on 54 bills. Many trips, phone calls and letters were required on the part of NAC staff on state legislative matters not to mention regulatory problems which required attention at the federal level. In addition, of course, the time and effort expended by numerous industry committees, individuals and other interested parties must be added to these efforts.

I believe that most of us in this field realize the importance of maintaining active contact with various state and local officials on matters of legislation and regulation as well as watching and working in the area of public relations. This problem of public relations, or perhaps I should say of adverse publicity, is one of the most critical and difficult problem areas with which we must deal today.

At this point I would like to comment on the importance of organizations like NAC in meeting these problems of the pesticide industry. I believe any formulator-

distributor, and of course, any pesticide manufacturer as well, who is not now a member of this association, just cannot be cognizant of the job being done, or of the tremendous job yet ahead. Admittedly, your officers and directors of NAC need and ask for your support, but anyone active in this agricultural pesticide business today needs the assistance of such organizations even more, no matter how small, or local they may be. I urge you all to support strong organizations in this field and to interest others in joining and supporting them also.

I am not sure whether my own personal experience and observations in my own Midwestern area will qualify me as an expert or not. Since my company markets a highly diversified line of chemical and allied products to a broad range of customers, I have had an opportunity to observe a number of different methods of distribution. No one method or pattern is best under all circumstances or for all chemical products in all areas. This is true, whether we are marketing agricultural chemicals, industrial chemicals, or chemical feed additives. Different methods and approaches are required for different products and to some degree, for the same product in different areas. Marketing patterns will vary as conditions, customers and geographic areas change.

I am deeply convinced of the importance of the function of formulators and basic distributors of agricultural chemicals in the United States economy today. I disagree with certain of the policies of some basic manufacturers, particularly when these policies involve by-passing these natural distributional outlets. I am more convinced than ever that the position of the strong local or regional formulator and distributor still has much future potential. During the past several years there may appear to have been a further trend away from formulators and basic distributors and to the handling of more

Sales

sales by direct representatives, at least by some national or integrated companies. I, for one, feel that this trend has moved too fast and too far without fully analyzing where such organizations fit into the marketing scheme. In spite of the rapid change in marketing emphasis, sales through formulator-distributors have generally kept pace with total sales of pesticides. I daresay that the overall sales for the formulator-distributors represented in this room have grown at about the same rate as those of the agricultural chemical industry as a whole.

I do not believe that there is any area of the chemical industry where the strong local or regional organization fits better into the marketing scheme than in the distribution of agricultural chemicals. I believe that strong local formulator-distributors will always be able to give better service than their national and larger competitors. They are closer to the market and are flexible enough to rapidly meet changing demand. Such well managed and aggressive organizations will always be important factors despite moves by certain companies to go direct through national field selling forces.

Several major patterns of distribution of pesticides are beginning to take recognizable form today:

1. Starting with the basic material, the basic manufacturer

and Marketing of Pesticides

by Robert S. Thompson,

Thompson-Hayward Chemical Co.
Kansas City, Missouri



sells to local formulators as well as to regional and national formulators, who in turn mix the active pesticide chemical with carriers, diluents and other materials to produce a usable pesticide product. The formulator then sells through either one or two resellers in one or two steps to the farmer.

2. Under the second pattern the basic manufacturer produces the basic chemical, formulates and sells the finished product through formulator-distributor outlets,—national, regional and local. These outlets in turn resell directly to dealers who service the farmer. This pattern now applies primarily to pesticides of specialized or limited market potential or during introductory marketing stages of a new pesticide but will become a more important marketing method in the future.
3. Under the third method the national formulator or integrated producer not only manufactures the basic material but also formulates the finished product. This organization then distributes this finished product through national field selling staffs, all too often by-passing the local or regional formulator-distributor, going direct to customers in the field.
4. A variation of the third method is known as "line or in-

line selling." The basic or protected or patented position not only sells the product in final form, but also sells technical material and sometimes the formulated product to his national formulator competitors. Such sales, often made on a preferred basis, are ostensibly to round out the competitor's basic lines, but often lead to "footballing" of the product in the field.

It is my opinion that the really successful local or regional formulator today must also be a jobber or distributor of proprietary specialty pesticides which are produced, manufactured and formulated by basic chemical manufacturers. Thus the term—"formulator-distributor."

In order to strengthen their position in preparation for the future, formulator-distributors should re-evaluate their selling and marketing practices today. First, they should make absolutely certain that their capital will sustain the volume of business which they are endeavoring to service. They should resolve to do business using capital which is self-generated, or properly advanced by local bankers. It is not advisable to depend upon capital which is temporarily and often unintentionally, invested by suppliers because of delayed payment or the acceptance of consign-

ment merchandise. I do not know of a product sold on consignment that has a decent profit margin for the middleman. Stop and think! Is there a reasonable profit in selling or packaging antifreeze?, turpentine?, lead arsenate?, or any pesticide where consignment is practiced? Doesn't the fact that we have consignment stocks with no present cash tied up cause even the best of us not only to overstock and over-extend ourselves, but also over stock and lead our outlets down an irresponsible path?

In my opinion, one of our biggest steps forward in the last several years in marketing practices has been the complete elimination of consignment selling of all pesticides in the northern one half of the Central United States, and of herbicides nationally. I believe that this has done more to strengthen our industry than any other move and will enable us in the long run to give better service to our ultimate customer, the farmer. This step, also has enabled us gradually to evolve channels and patterns of distribution which offer further hope for the future. Dealers and distributors who traditionally protested they could not pay cash have, in fact, paid cash. Apparently, their bankers, or someone, has finally shown them that they were paying a very high rate of interest by not taking advantage of the 5% discount offered for payment in 30 days.

I believe that this step away from consignment selling should be

*Delivered at 26th Annual Meeting of National Agricultural Chemicals Association, French Lick, Indiana, October 21, 1959.

Also presented at the 30th annual meeting of the Western Agricultural Chemicals Association, San Mateo, Calif., October 14.

carried a good deal further. I do not believe that basic manufacturers should sell their technical products and basic materials on a consignment or dating basis, because in doing so they are really weakening the formulator-distributor who is their key link in the distribution chain. I believe and know firmly from experience, that an investment, whether made in a plant, invested in raw materials or finished stock, or in the cost of sales and market development expense, makes for a more constructive and stronger marketer of any product. The frequently stated advantage of free warehousing that goes with consignment selling is a fictitious one. The claimed advantage that consignment or dated selling, or pre-season discounts, overcome the reluctance of formulators, distributors, or dealers to buy in advance, is an equal myth.

The advantages of selling on regular or normal terms are numerous. A more accurate knowledge of inventory investment is possible when the merchandise is under your direct control. This is next to impossible when you must depend on consignment reports, which all too often, are late, or are not forthcoming at all until after the active season is over. The physical condition of your inventory is known at all times. Inventory shifts from one territory to another can be made quickly to meet changing demands without having to negotiate with the buyer who may have warehoused the material for many months. Costs of carrying inventory can be precisely calculated and included in the selling price.

The cash basis of doing business is rapidly separating the real formulators, distributors and dealers from the marginal ones. Financing of these transactions is being increasingly handled at local banks where it belongs. No supplier anywhere along the line should be in the banking business, trying to finance every level of the production and distribution channels. No matter how you figure it, capital costs money. Capital tied

up in inventory in your customer's place of business is not earning you as high a return as if it were invested in your own stock in your own warehouse where it can turn faster. Competing with consignment selling practices of big corporation is difficult for the small business with limited capital.

There are many other costs which have either been overlooked or understated in these calculations. These include costs of record keeping, price disagreements and damage to merchandise. The outlet which does not have to pay cash is far more likely to build excessive inventories, duplicate inventories of several manufacturers, or formulators, than is the man who purchases for cash and has to explain to the local banker why he needs more inventory money.

In any business that is highly seasonal, consignment looks particularly attractive. It looks as though you are getting someone else to do your warehousing for you. Let me say again, we are deluding ourselves if we think that we aren't paying a substantial price for supposedly "free" warehousing. If you are on the receiving end of a consignment arrangement there are also more disadvantages than advantages.

Very frankly, my company for over three years now has expended much effort reversing a negative attitude on the part of our sales staffs. It seemed we looked for a way to sell at a lower price rather than a way to maintain our margins and thus improve our selling activities and we were not alone! This program is beginning to pay off dramatically in improved profits and surprisingly enough with increased sales. We are concentrating on products which have reasonable margins of profit, selling them in lower volume, and then capitalizing on a market once developed rather than spending all our time on our formulated field crop pesticides which may sell in high volume but usually with little or no profit.

I can well remember the day several years ago when I realized we were finally making headway in convincing our field managers, first of all, that consignment, protected or dated selling of any type was inimical to our best interests, and second that volume without profit would lead us into much future difficulty, if not insolvency. This proof came early in the selling season from a Southern manager. He had always insisted we must match the consignment selling practices and low prices of our competitors, pound for pound and dollar for dollar. On his own initiative he liquidated all consignment stocks of cotton poisons in the hands of dealers and generally discontinued selling low profit field pesticides to concentrate on specialties and other products where reasonable profits could be realized. Even though this action resulted in a loss of one million dollars of sales on formulated cotton pesticides that year net profits never suffered and are better at that branch today than ever before.

Perhaps there are formulators who feel they can make their way selling only their own branded and formulated products in high volume at low profit margins. However, I can assure you my company is not one of them. We are continuing to aggressively market products where we formulate and manufacture, but only where we can make a reasonable profit. We are emphasizing and revitalizing our position as a distributor in the agricultural chemical field. Our net returns have improved considerably since we started this program approximately three years ago.

Formulator-distributors should give up the idea that they are basic manufacturers with some protected position. They are just performing one more step in the distribution chain. True, they should be paid an additional profit for this service. However, if they want to be strong local or regional outlets they should also eagerly act as distribu-

tors of proprietary formulated pesticides for basic producers as well. There is real merit and profit in diversifying sales activities in this way.

Also, formulator-distributors, particularly in view of the considerable business gamble which must be taken each year in estimating pesticide requirements in their areas, should make absolutely sure that the profit margins are adequate. This means profit margins must be higher on formulated products than on resale items which are distributed under original labels. No step in the marketing pattern which is performed should be slighted in assigning costs. Many formulators believe that they can consider just one overall gross profit between their raw material cost and final selling price. Regardless of size, a reasonable effort must be made to assign actual costs of conversion of technical materials to finished formulated products. The processing loss which occurs in every formulating plant must be calculated; proper laboratory and supervising costs must be assigned; greater product liability exposure on formulated products must be considered; warehousing costs which everyone has must be added. Sales costs, as well as indirect administrative costs which accrue to small and large alike must be included. Above all, because of the seasonal nature of this business and the risk involved of carrying over inventories from season to season, the higher cost of lower capital turnover must be figured.

I am aware of the adverse geographical problems inherent in the marketing of agricultural chemicals. However, I believe that I can forecast accurately one trend that will be more generally in evidence in the future. Basic manufacturers who must expend large sums to develop new products will tend to market them through carefully selected and controlled channels. New products protected by patented or basic position are more likely to be formulated and mar-

keted, at least in the initial stages, as a proprietary and branded product of the basic manufacturer. In the past new agricultural technical toxicants related to formulators all too often have been marketed in such a disorderly manner that profit margins were reduced below the amount required to properly introduce, advance and expand the market for these products.

We, as formulator-distributors, must recognize and support these manufacturers who are trying to constructively introduce and market new and valuable products in our field. We must recognize that the costly gamble of developing new products from the research laboratories up to and through all the extensive tests, field trials and market development stages, requires from one to two million dollars, and this costly gamble must hold promise of paying back handsome returns. The only way today a developer of a new agricultural pesticide can reap the rewards of success to which he is entitled in this high risk business, is to assure himself that the profit margins will be maintained at a proper level during the future marketing of the formulated products. Thus the need for more controlled marketing methods in the distribution of new pesticides.

The experience of my own company during the past few years has been one of changing emphasis. Until several years ago we made a larger percentage of our profits in the agricultural chemical field from marketing and selling our own formulated and branded field crop pesticides than we did from selling proprietaries. We now make a higher proportion of our profits selling many new and specialized proprietary products manufactured and formulated by others. We have encouraged this trend of manufacturers who are desirous of marketing products in this manner. We are trying to help maintain proper margins so that we can perform the specialized selling job required to properly introduce these new

specialized products. We are actively soliciting the opportunity to distribute proprietary and specialized products and are supporting those manufacturers who are looking to companies of our type to market their products.

For the benefit of any outsider who might not appreciate the high cost of developing and marketing new pesticides today, I should explain that I am not speaking of excessive profits. Any one familiar with this field realizes that it is not possible to make an excessive profit today on any agricultural product, no matter how new, or how well protected by patent or basic position. First, new chemical pesticides must compete with older products already available. Second, we are competing for the farmers' dollar and must show his real cost savings or more profit in order to attract his attention, have him try, and then regularly use our new products.

I believe many of us recognize that the failure of the herbicide industry to properly expand the market for 2,4-D as extensively as might have been possible, has been due largely to low profits and demoralized markets. Whether the farmer pays \$4.00 or \$6.00 for a gallon of 2,4-D has very little direct effect upon the economic use of this versatile herbicide since only a few ounces are required to kill literally millions of weeds. The problem, however, has been that neither the basic manufacturer, the formulator, jobber or dealer has had proper or reasonable profits to finance an aggressive sales and promotion program to increase and expand the general market for 2,4-D. Despite the fact that we are selling some thirty million pounds of 2,4-D a year, we have reached the ridiculous stage where even the largest manufacturer apparently cannot afford the necessary expenditure to obtain clearance under the Miller Amendment for the use of 2,4-D on forage. Nor have we spent adequate sums to educate

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Control Chemists Discuss Tolerances

AT the annual "Conference on Chemical Control Problems", held October 15th in Washington, D. C., some 200 state chemists, government and industry representatives discussed tolerance levels in fertilizer analysis, evaluated methods for chemical analysis, and reviewed the Magruder Check Sample Analysis method. The meeting is sponsored by National Plant Food Institute. Dr. Vincent Sauchelli acted as chairman. The Conference is held annually in conjunction with meetings of control officials in the fertilizer, insecticide and feed industries. Members attending the meeting agreed that from a practical standpoint, there is no agronomic value in terms of measurement of crop yields, in meeting tolerance requirements. It was observed, however, that farmers take it for granted that State Control Officials are looking after their (the farmer's) interest in checking product guarantees, product registration, etc.

Outlining the relation of the California Regulatory Office to the local fertilizer industry, R. Z. Rollins, chief, Bureau of Chemistry, California Department of Agriculture, discussed California procedures and relations in connection with licensing, labeling, sampling, and registration of agricultural chemicals. Mr. Rollins' comments are particularly significant, when it is noted that the tonnage of fertilizer used in California is ten per cent of all fertilizer used in the Continental United States. Only 2% of fertilizer mixtures are used in California, but over 23% of all fertilizer materials are applied in California. Other interesting statistics on fertilizer use in California show that of the materials used for direct application of fertilizers, 23% of the urea and 54% of the other chemical nitrogen materials are applied in California, — also that California uses more than 80%

of the secondary and trace elements in direct application.

Commenting on sampling fertilizer products, Mr. Rollins indicated that at time of sampling, 68% of the time the product is in the hands of the purchaser, 25% it is en route, and about 10% of the time it is in the hands of the registrar. Based on the analysis of the sample, manufacturers are classified according to their aim, and not necessarily their control. In cases of consistent deficient deliveries, manufacturers are invited to the California Bureau to discuss possible reasons for the deficiencies. Mr. Rollins indicated the California Department of Agriculture is interested in helping the manufacturer change processing techniques to avoid deficient products, and thus works closely with industry in this direction.

Direct problems of chemical analysis were reported by several state experts. W. J. Youden, Na-

tional Bureau of Standards reported on "Statistical Methods of Chemical Analysis", while Edwin M. Glocker of the W. R. Grace Co., reported on "How to Use the Data of the Magruder Check Sample Statistical Analysis." Nelson White, International Minerals and Chemical, confirmed management's strong interest in the chemical control laboratory, and John Brabson, TVA, stressed the importance of a firm foundation for analytical measurement methods. Mr. Brabson observed that authors of new methods and procedures should do a better job of evaluating their procedures before having such work published, leaving this burden on fellow chemists. Reporting on "Tolerance Levels in Chemical Fertilizer Analyses", F. W. Quackenbush, Indiana State Chemist, advised that lack of uniformity is a basic cause of problems in meeting product specifications, and also of product separation. Also commenting on tolerance levels were C. H. Perrin, Canada Packers Ltd., H. J. Webb, Clemson Agricultural College, and A. J. Duncan, Johns Hopkins University.

IN PLANT SHRINKAGE OF FERTILIZER POSES SUBSTANTIAL LOSS AT 15%—CONTRIBUTING FACTORS DISCUSSED AT CONTROL MEETING

IN-PLANT shrinkage of fertilizer materials has become a very substantial problem in recent years, amounting to as much as 15%, compared with the 2% loss accepted before 1950 as a standard figure for practically all fertilizer plants, stated Dale C. Kieffer of Smith-Douglass Co., Norfolk, Va., in addressing the thirteenth annual meeting of the Association of American Fertilizer Control Officials, held in Washington, D.C., October 16th. This increase in shrinkage has been brought about by drastic changes in the source of raw materials, particularly nitro-

gen, — the use in modern fertilizer technology of much more highly concentrated raw materials.

More concentrated and cheaper forms of nitrogen were offered after World War II, (as a consequence of by-products of explosive plants). An increase in production of concentrated phosphates has supplemented, and in many cases replaced the old standard normal superphosphate. And more recently, industry has also started using significant amounts of diammonium phosphate and phosphoric acid, with DAP containing 20.5% nitrogen and 53% P_2O_5 .

and the phosphoric acid analyzing about 54% P_2O_5 . High grade muriate of potash has also contributed to the upgrading of materials produced by the fertilizer industry. It should be obvious that casual handling of concentrated raw materials such as these can readily contribute to very substantial material losses, — and that fertilizer plants using modern raw materials for higher grade products, cannot tolerate sloppy or careless materials handling methods.

Mr. Kieffer reported that his comments are preliminary to a report that will be made on the subject of In-Plant Shrinkage, based on a study of the subject by an NPFI committee, in which he, Dr. Vincent Sauchelli and James Reynolds are participating.

Ammonia losses, he said, have become as high as 10-12% in some plants. Progress to cut this loss has been made, but there is still room for improvement. Granulation and granulating plants pose still another problem in reducing plant losses. Because granulating plants are based on use of acidic materials and ammonia to generate heat in the ammoniator-granulator, losses of ammonia can be anticipated in stack gases. A dryer (and consequently a stack) is essential to the modern granulating plant. To avoid material losses, through the dryer, medium sized plants are spending more money today for installation of dust collecting equipment on dryers than was required fifteen years ago for an entire mixing unit.

Still another source of material losses is the packaging room of the plant, where operators tend to overweigh the bags as a safeguard

against shortweights. Even with automatic packaging equipment, overweights are still common. Mr. Kieffer summarized his comments on plant losses by observing that In-Plant Shrinkage tends to be considerably less in plants using batch mixers, since: these plants seldom use anhydrous ammonia, ammoniation rates are substantially lower, and they do not normally use a dryer (since non-granular fertilizers are not dried). In batch mixing plants, nitrogen losses are reported at about 3.8%, P_2O_5 at 2.8%, and K at 3.9%. In granulating plants, losses are about: 6.8% for nitrogen, 2.75% for P_2O_5 , and 5.03% for potash.

Plants making granular ammoniated fertilizers often incur substantial losses because they tend to overformulate. The overformulation is intended to compensate for loss of nitrogen, reversion of available P_2O_5 , and to insure plant food guarantees. Overformulation in batch plants is insignificant, since these use only solutions and dry materials as raw materials. The greatest plant losses are believed to occur during mixing, and are attributed to fumes and gas from the ammoniator . . . it is primarily a nitrogen loss.

Elect Randle President

Fertilizer Control Officials at their business session elected Stanley B. Randle, New Brunswick, N. J. as president, to succeed F. W. Quackenbush, Lafayette, Ind. Charles Marshall, Ottawa, Canada, was elected vice president, and Bruce D. Cloaninger, Clemson, S. C. was re-elected secretary-treasurer. Members also elected Robert Guntert, Topeka, Kans., to the ex-

ecutive committee, which includes also the president, vice president, retiring president and secretary. E. A. Epps, Jr., Baton Rouge, La., and Floyd Roberts, Mesa, Ariz., continue as members of the executive committee.

In his address to the AAFCO, retiring president F. W. Quackenbush presented a series of observations which he feels bear on the demands put on the fertilizer industry and state officials who have the responsibility for policing fertilizer control measures.

He indicated that state officials have a responsibility to gather and compile information on the changes in fertilizer use, — classified tonnage information. If the state law doesn't require that this be done, Mr. Quackenbush suggested that officials should work toward a revision of the state laws.

"We need to exert a concerted effort to prevent evasion of our laws under the guise of 'custom mixing'", he continued. Commercial grades are generally higher in plant foods than the amount they actually guarantee. But this 'overweight' is not likely to be provided in a custom mix, particularly when it is clearly understood that the product so made is not subject to test."

Mr. Quackenbush also indicated that the plant food industry in general needs to step up its research on the chemistry and technology of plant food production, — and that chemists and state and industrial laboratories need to conform more closely to standardized procedures. More uniformity of fertilizer products is required if the industry is to cut down on amount of overformulation necessary to meet a guarantee, — and a study of facts underlying segregation of plant food mixtures should be made to cope with this industry problem.

Mr. Quackenbush concluded his remarks with the suggestion that the industry give some thought to modernizing its name.

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Fertilizer Control Officials Elect

Stanley B. Randle President For 1960

Charles Marshall Named Vice President

Advertising and Promotion



Figures shown NAC members illustrating pesticide promotion.

"How can the Agricultural Chemical Industry Increase Sales and Profits?"

Over the years, there have been many answers to this question. Depending on who is giving the answer, the solution alternately seems to lie in: more research and development; better products; better distribution; skillful salesmanship; better pricing policies; tighter credit and so on. The advertising man will readily acknowledge the impelling necessity for research, sales manufacturing, credit, and packaging. But try to find anyone *else* in our industry who will ever admit (unless under duress) the urgent need for the advertising and promotion of pesticides! Therefore, before going any further with this subject, let me make a small plea for a more sympathetic attitude towards us poor advertising guys—let's all work together for the betterment of our industry—and, incidentally, let's give some mutual protection to each other's jobs!

In the short time that we have been allotted for this subject, I should like to make three points:

First, we need to take a look at the fundamentals—just what part does advertising play in the sale of pesticides?

Second, what are we spending on advertising and promotion of pesticides in relation to other industry programs, and

Third, what *should* we be doing?

First — let's forget about an exotic, sophisticated discussion of

advertising. "Is advertising a capital investment or is it current expense?" "What about motivational research?" "Let's make sure we know how big the market is." Let's skip such advertising esoterica which is lots of fun, but in my opinion practically valueless as far as our industry is concerned.

Let's go back to fundamentals and take another look at just what part advertising plays in making a sale. (Chart on facing page).

At the risk of sounding elementary, the facts in our industry, and in a great many other industries, would indicate the need to be constantly reminded of the six steps in manufacturing sales.

Advertising saves your salesman the first three big steps: *Contacting the prospect, arousing his interest, and creating a preference.* The dealer, distributor or company salesman now takes over and *makes a specific proposal, closes the order, and keeps the customer sold.*

For the second point, let's take a look at a very interesting figure: (Figure at top of page).

Here we see a study which shows the total 1958 advertising in five trade classifications in a mid-west state farm paper. This magazine happens to be *Wallace's Farmer* but this picture is typical of other farm media throughout the country as you will see shortly.

Many of us are familiar with the Iowa State College study on "What Influences the Farmer to Buy," with its strong statistical

endorsement of farm papers and magazines as effective sales tools in the introduction and sale of farm products.

Even though we may be familiar with the study, the people who are taking action on this endorsement are the Farm Machinery, Remedy and Feed Supplement, and Feed Manufacturers. While we in Agricultural Chemicals feebly buzzed around the Iowa farmer with an industry total of 36 advertising pages during all of 1958, he was being clobbered by 207 pages of Farm Machinery advertising, 130 pages of Remedy and Feed Supplement advertising, and 125 pages of Feed advertising. A closer look at the figures shows that 29 Agricultural Chemical firms averaged only 1.2 pages each for the whole year.

One might view these figures, with the attitude, "Well, maybe the farm machinery business is seven times that of Agricultural Chemicals, so we're doing a proper job in relation to the market."

Our response to this would be first, that we know the *potential* for Agricultural Chemicals is much greater than one-seventh of the machinery market. All statistics seem to point to the fact that Agricultural Chemicals are in the pioneering or growth stage of development. Because of this, it is necessary for us to make a greater investment in advertising and promotion than that of a well estab-

of Pesticides

by Louis F. Czujin*

California Spray Chemical Corp.
Richmond, Calif.

lished "accepted-practice" industry. Second, we should look at the tremendous opportunity any Agricultural Chemical company has to move in and dominate any market that it chooses with powerful advertising and promotion. With an average of only 1.2 pages per company per year, a consistent program of say 12 to 18 pages per year of advertising for any single well-coordinated company would practically assure market domination.

Another figure of interest, there were 234 companies battling for the farmers' equipment and machinery business . . . and we thought we had competition!

Examination of the advertising volume in the same five trade categories in a leading *Regional* farm magazine shows pretty much the

same comparisons. This study is on 1958 volume in *Progressive Farmer* which is issued 12 times a year as compared with 24 for Wallace's *Farmer*. Here again, Agricultural Chemicals ran a poor fifth in advertising expenditures in these five categories. A reminder: Here is a powerful advertising medium, skillfully designed so that your advertising will *contact, arouse, and create interest* with some 1,300,000 southern farmers and ranchers. So, what advertising does our industry run in this powerful magazine? A mere ripple of 19 pages for the whole year for the whole industry! We must draw the same conclusion, here lies a rare opportunity to earn an easy victory for any agricultural chemical company that wants to tell an effective sales story in a dominant way. The investment would involve some 12 to 18 pages of advertising—and the southern farmers and ranchers would really be *contacted, interested, and most certainly aroused!* The pharmaceutical firms are doing it with antibiotics on the farm and the rocketing rise of *that* industry in agricultural sales is known to all of us. And by the way, antibiotics and insecticides have a lot in common insofar as marketing is concerned. We have found that a very large segment of agriculture doesn't use either one. At least, these farmers feel they don't *have* to use either one.

They are extra expenditures that they feel they can get along without. However, the aggressive advertising and promotion tactics of the remedy manufacturers are successfully convincing these farmers of the extra profits that are made from using these products.

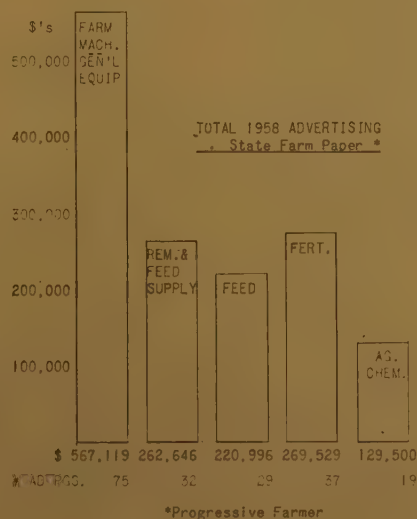
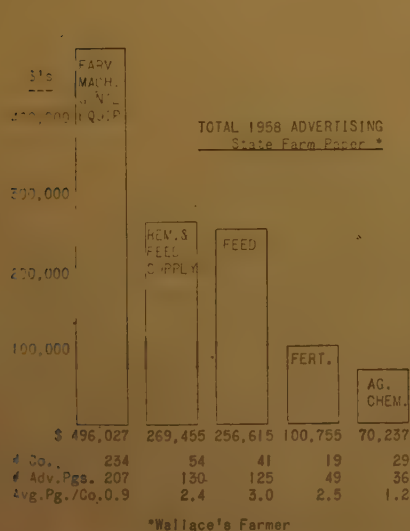
Yes, we are in a pioneering stage in our business and don't think it's only the small farmer who is ignoring the use of insecticides, fungicides, weed killers, and seed treaters.

Here is a recent study made on a large scale farmer in Pennsylvania: This profile indicates that he has 2,526 acres; he has 22 men to do the field work; he raises poultry, hogs, beef cattle, produces milk, eggs; he raises much of his own feed and he has his own feed mill.

This grower was interviewed and a "shopping list" of what he will buy for 1960 was developed. He will buy, for example, 25,000 gallons of gasoline; 13 tractors, combines, cultivators, barn cleaners; 200 tons of fertilizer, 3 tons of salt and minerals. He will buy antibiotics, seed, pipe, pumps, trucks and incidentally 100 tires. Nowhere on this list do we see a mention of anticipated purchases of Agricultural Chemicals of any kind. Here we feel is a striking example of the need for our industry to develop the market and the potential. We must think of advertising and promotion expenditures in terms of cultivating the market and spending *market development dollars*. Until our business falls into the "accepted practice" category, we must spend advertising money not only to sell but also to educate.

For the third and last point, I would like to touch upon some of the advertising and sales promotion techniques and devices which have worked so well for many successful marketers, and which we should examine carefully in connection with our problems.

Consider this a check list—are we making full use of these sales



WACA Elects George Weldon President for '60

Newly elected president, George Weldon, Velsicol Chemical Corp.; Charles Barnard, WACA executive secretary; and retiring president Ivor Burden, United-Heckathorn.



TWO hundred and fifty members and guests of the Western Agricultural Chemicals Association met for their 30th annual meeting at the Villa Hotel in San Mateo, California, October 13-14.

The first day of the meeting was devoted to golf and bowling tournaments for members while the annual directors meeting and election of new officers was held at the Villa Hotel. George Weldon of Velsicol Corporation was elected president, succeeding Ivor Burden of United-Heckathorn, who retired after serving a two-year term. George Poppic of Coastal Chemical Co., Oxnard, Calif., was elected vice-president, succeeding Jack White of White Chemical Company.

The first speaker at the October 14th session was Robert S. Thompson, president, Thompson-Hayward Chemical Co., Kansas City, Mo., who spoke on "The Position of the Formulator-Distributor". Mr. Thompson opened with a brief discussion of the problems of government regulations and adverse publicity, and urged that all formulators should support industry organizations such as the WACA and NACA.

The principal portion of his talk, which was also delivered at the NACA meeting at French Lick on October 21-23 was devoted to a review of the position of the formulator-distributor. (For the full text, see page 42 of this issue.)

H. F. Tomasek, president, Chemagro Corp., Kansas, City, Mo., spoke on "The Era of the

Merchant", commenting that competition in the agricultural chemical field has become more intense and broader in scope.

He said that, previously, competition was twofold in nature: companies competed in plants in an effort to secure cheaper processes of production and also competed with sales forces, many times utilizing the lower cost of a new process in order to offer a lower selling price. What they saved in one place, he explained, they gave away in another. As a result, earnings and the desire for real growth were static.

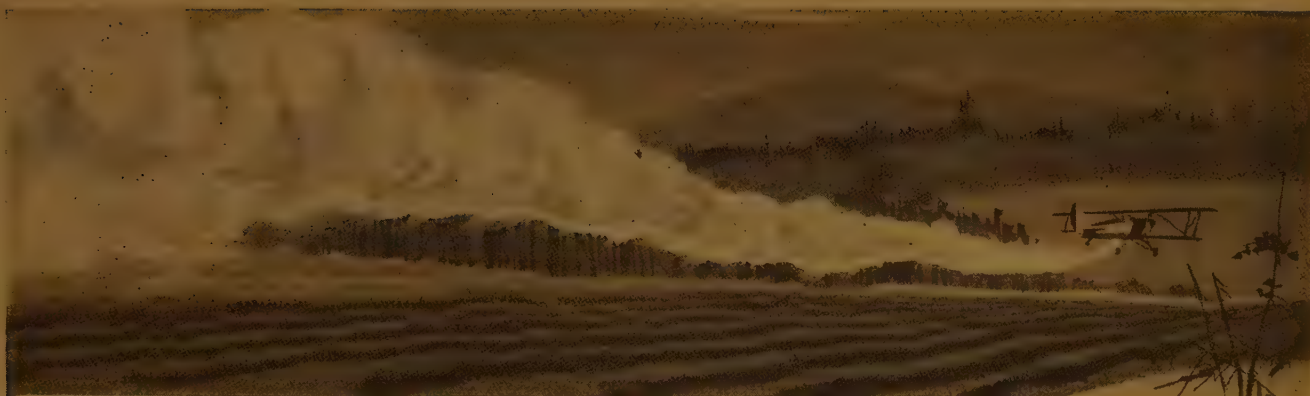
Mr. Tomasek explained that a new factor has now been added, —competition in the area of research. This change, he said, has been good both for the industry and for the farmer who utilizes the new and improved products, but it has increased the cost of doing business. As more new products come out of the laboratories, more extensive public systems at the federal and state level are required for testing, more chemists are needed to study and safeguard the surrounding chemistry of the new product, and field staffs must be increased to work with public agencies to evaluate effectiveness. These factors, together with the effects on developmental costs arising from increasing legislation, which must be satisfied in order to secure registration for sale, have increased the cost of launching a new product at least 50 per cent from what it was five years ago, according to Mr. Tomasek.

He said that he has heard estimates as to the cost of bringing a new product to market ranging from \$500,000 to over \$3,000,000.

Mr. Tomasek said, because of these increased costs and risks of doing business, the agricultural field has entered the era of the merchant rather than the salesman. A salesman he described as someone who sells without regard to cost of the product or profit. A merchant, on the other hand, is someone who buys and sells at a profit. He urged that, since manufacturers must buy goods at a price which must include not only material and labor, but also the cost of research, development, engineering new plants, etc., they must also sell at a margin above this cost to assure a profitable operation and the necessary capital to continue.

In conclusion, Mr. Tomasek said he believes that the agricultural chemical competitive picture is changing from one where companies compete with one another on identical products to one where they will compete on new patented products that are similar in their end accomplishment but different chemically. He feels that the requirements of this type of competition will lead to greater stability within the industry, and assure the maintenance of a strong competitive research system to provide improved products to be sold at a profit.

Donald Lerch, Jr., Donald Lerch & Co., Washington, D. C., talked on "Winning Friends and



TOXIMUL R and S . . . at last an emulsifier pair for *all* toxicant systems. Now, for the first time, it is possible to emulsify any of the pesticide types, such as weed killers and chlorinated and phosphated insecticides, with a single emulsifier pair. Better yet . . . you'll do it more effectively. Toximul R and S are your answer to cutting your costs . . . cutting your inventory and simplifying your formulations. You also will find they promote better storage stability even with the more unstable or highly reactive systems. **NEW TOXIMUL LF.** Another new Stepan product . . . a universal emulsifier for pesticides in liquid fertilizer. Toximul LF, which is extremely low in moisture, will give you maximum efficiency for emulsifying soil insecticides and other toxicants in most liquid fertilizers. It also gives storage stability. • Let us tell you more about these new Stepan products. Send coupon below today!



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Gaining Customers", saying that the agricultural industry needs to gain greater public confidence to offset the pressure groups who oppose the use of pesticides.

He touched on past controversies that hampered the gypsy moth spray program in New York, Dutch elm disease control in Milwaukee and fire ant eradication in the South. On the other hand, he pointed out, the reverse was true in the recent case of the encephalitis outbreak in New Jersey. After a number of people were infected by mosquitoes and several deaths had occurred, the entire community demanded intensified spraying with insecticides.

Mr. Lerch said it is the industry's job to inform the public correctly about insecticides, and, like selling products, it is a job which never ends. It is also a job which must expand as population and the industry expand. He said that the agricultural chemical industry is on the threshold of a vast expansion and the industry's growing importance is putting everyone in the spotlight.

He traced the constructive actions which have been taken by the industry to correct the misinformation about pesticides which the public has received—booklets, slide kits, magazine articles, radio and television speeches. He praised the work of industry associations such as the WACA and NACA, and also the work of individual companies in working with farm, government and conservation group leaders.

But, he continued, it is time for the industry to emphasize leadership in taking a larger role in the formation of national agricultural policies and in developing closer relationships with groups in fields affecting the industry, such as forestry, highway roadside maintenance, wildlife and soil conservation. He urged that the industry make new friends in the USDA's 2,800 Soil Conservation Districts, and the U. S. Forest Service, which he said are two

of the most important groups whose decisions affect the agricultural chemical field. The future prosperity of the industry, he concluded, will be determined by the degree of leadership which the agricultural industry is willing to assume.

The afternoon session was originally planned as a panel discussion in two parts, covering the commercial and marketing aspects of the agricultural chemicals industry. Because of time limitations, only the first part of the panel devoted to commercial aspects was completed. The panel covering marketing aspects will be heard at the March WACA meeting.

The first speaker on commercial aspects was Justus C. Ward, chief, pesticide regulation branch, U. S. D. A. Washington, D. C., who spoke on "Labeling of Pesticides". Mr. Ward discussed the recent amendment to the Insecticide, Fungicide and Rodenticide Act which adds four new categories to govern labeling practices of all products with possible residue effects on foods. The new categories included are 1. plant growth regulators 2. defoliants 3. nematocides 4. desiccants. Mr. Ward pointed out that products in use prior to the effective date of the new law will not come under its provisions until the 5th of March, 1961.

Mr. Ward said that, regarding labeling of pesticides, the residue problem is presently the dominant feature, but precautionary labeling is of increasing importance. He observed that precautionary labeling of pesticides has resulted in a reasonably good history of safety for the industry. Only 10 per cent of accidental deaths due to ingestion of a toxic material, he reported, are caused by pesticides, as compared with 35 per cent for drugs.

Mr. Ward explained how the USDA has worked with the trade on many "no-residue" products,—but will not register new products or new uses for old products where

residue problems on food exist until the Food and Drug Administration has completed its studies. Correct labeling under this procedure insures that the farmer who uses a product under the terms of a label will not have a residue problem.

Mr. Ward urged a review of labeling on all older products and a check of existing labels with respect to residue tolerances which may have been established. He also cautioned manufacturers on the possibility of further restrictive labeling because of the pressure from fish and game conservationists as a result of pesticide effects on wild life.

He emphasized that labels must be so affixed to the package that they will stay on, even under conditions of rough handling. If torn off, the product automatically becomes an illegally labeled package. The same situation applies, of course, to broken packages. It has always been a violation for a supplier to resell the contents of a broken package in bulk without labeling.

In conclusion Mr. Ward urged both government and industry to work together to educate the farmer to follow label instructions to the letter.

Newton E. Davis of the legal department of Shell Chemical Corp. discussed "Product Liability", explaining that the label should govern product liability and would if the salesman and advertising said nothing further except what's on the label.

Mr. Davis pointed out that product liability extends to many parties,—property owner and applicator—not just the buyer and manufacturer. He cited many cases where liability was imposed and expressed the fear that if those who make or use pesticides continue to suffer serious liability losses, somewhere along the line they may decide that continued use of some very necessary products is too risky. He pointed out that liability

(Continued on Page 109)

A NEW post-emergence herbicide for the control of wild oats was announced by Spencer Chemical Co., Kansas City, at a Weed and Nematode Forum held October 19 and 20 at the Spencer Research Center. The product, tradenamed "Carbyne" (4-Chloro-2-butynyl N-(3-chlorophenyl) carbamate), is the result of a five-year Spencer project to develop new agricultural chemicals.

Outlining "A historical development of Carbyne," Dr. T. R. Hopkins, Spencer section leader in organic research reported, "The mechanism by which Carbyne attacks oats is not yet clearly understood. Our information developed to date indicates the compound is 75-80% absorbed, and is then transported in the plant. The major portion probably moves upwards but some quantity moves downward, through the innernode to the growing point. From all appearances, the chemical is a mitotic poison which is consistent with other carbamate herbicides. Investigations elucidating the mode and type of activity are now underway.

"The toxicology of Carbyne shows an acute oral LD₅₀ of 1.3 gm/kg. on rats. No ill effects were encountered on inhalation, eye and skin irritation tests on rats, mice, rabbits and guinea pigs. Sub-acute toxicity tests for 90 days on rats showed no effects. Chronic tests on rats and dogs for 9 months have raised no questions. During the past few years certain intermediates and the active ingredient itself have caused isolated cases of dermatitis. Patch tests on humans show a high incidence of sensitivity but the compound is not a sensitizer. Proper precautions should be taken when the skin is contacted with Carbyne such as thorough washing with soap and water."

Discussing Spencer's 1959 Carbyne field results program, P. W. Gull, new agricultural product development manager, discussed the wild oat problem and use of the new herbicide in its control. He observed that two factors which

CARBYNE...New Post-Emergence Herbicide

announced by Spencer Chemical Co.

make the wild oat a particularly serious pest are: its shattering characteristic and variable dormancy. Both factors contribute to the uncertainty, from year to year, as to whether the weed will present a serious infestation that year. Mr. Gull pointed out that it is for this reason that a post-emergence herbicide is desirable.

Some 25,000 tests have been conducted in Spencer greenhouses studying factors related to proper methods of application of Carbyne. For the past two years, Spencer has also conducted extensive field experiments in the United States and Canada. Results of all tests have been compiled and analyzed, and Spencer reports that Carbyne is a safe herbicide to use on wheat, barley, flax, sugar beets and peas. All of these crops show a low injury index for the 1/2-pound rate when applied at the proper date for the control of wild oats.

Mr. Gull stated, "We are going to recommend that Carbyne be used on wheat and barley at 1/2 lb. per acre when the wild oats are in the 1 1/2 to 2 1/4 leaf stage or the crop in the 1 1/2 to 2 1/2 leaf stage or 6 to 9 days after the emergence of the crop and wild oats when they are growing under normal growing conditions. On flax, the timing is perhaps somewhat more critical; however, we are saying that Carbyne should be applied when the wild oats are in the 1 1/2 to 2 1/4 leaf stage and when flax is in the 8 to 10 leaf stage or 6 to 9 days after emergence. On sugar beets and peas, the rate may be increased, therefore we are saying Carbyne should be applied at 1 1/2 to 1 lb. per acre when the wild oats are in the 1 1/2 to 2 1/4 stage or 6 to 9 days after the emergence of wild oats.

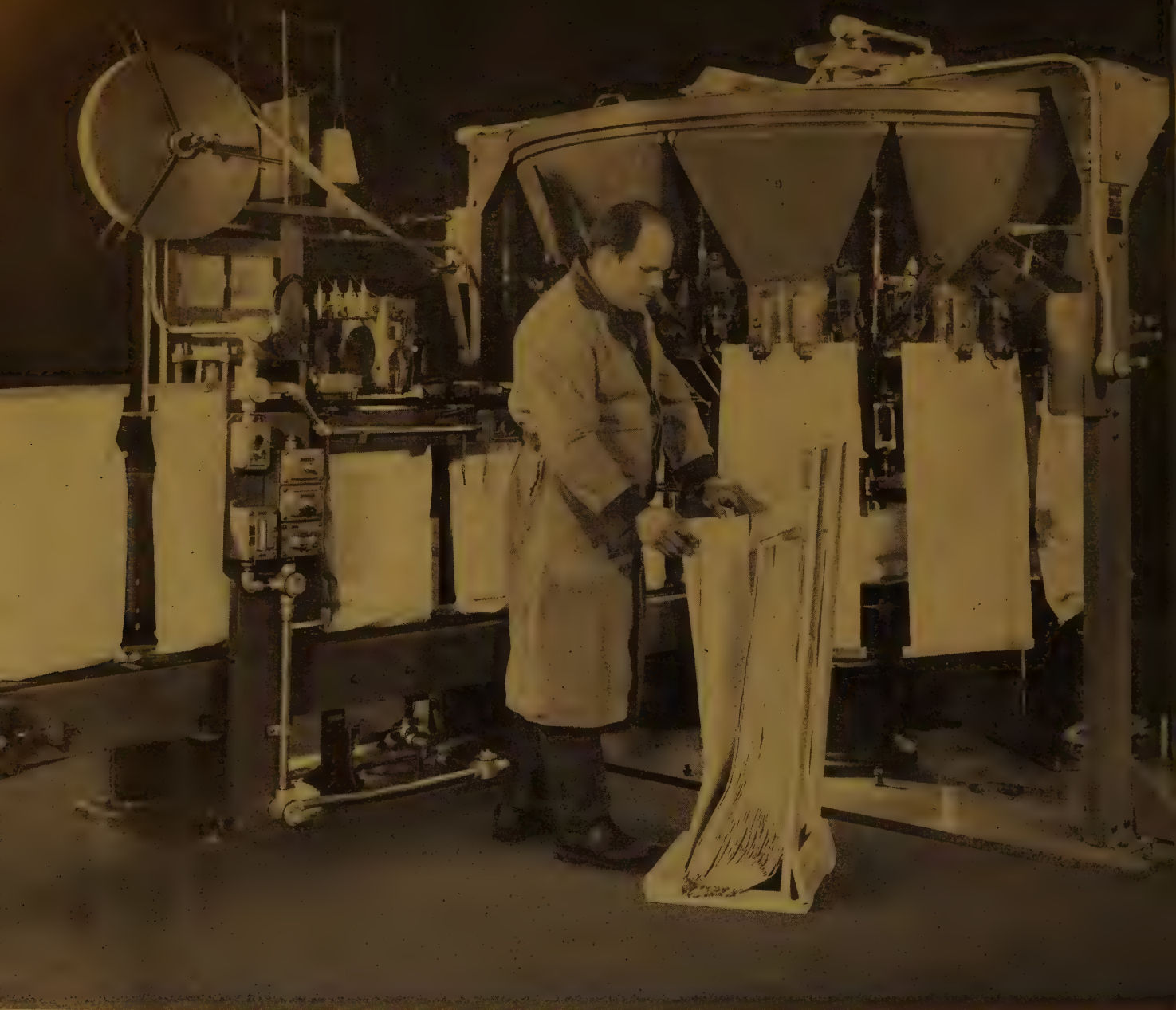
"Once wild oats pass the 2 1/4 leaf stage or the 9th day of growth after emergence when growing conditions are such that the plants are developing normally, control decreases at a rather rapid rate. Once wild oat plants have reached the 3 leaf stage they have become quite resistant to the activity of the chemical and beyond this stage they are only delayed and stunted for a short period of time. So we cannot emphasize too strongly the importance of proper timing in the use of Carbyne. Its high selectivity is dependent upon use at the proper date and at recommended rates."

H. E. Bingham, general manager of new products, agricultural chemicals division, announced that Spencer has made application to the USDA and CDA for registration of Carbyne. "If registration is obtained," he said, "we have a plan to use supervised distributors and technically trained personnel to assist selected farmers in the use of Carbyne." "We realize only too clearly," he continued, "that misuse by a few farmers in an area can prevent others from trying it, due to the grapevine of information. These farmers we work with this next year, must share the responsibility of success with us by applying the chemical at the right time and in the proper amount."

As to next year's anticipated sales, Mr. Bingham advised that the amount of material will be small. The acreage per farm will be small,—and the number of farms will be in proportion to Spencer's ability and supervised distributor's ability to assist the farmer.

Spencer is currently having a manufacturer of fine chemicals supply the amount required for 1960. Spencer has decided to use

(Continued on Page 119)



Famous Model "AF" Bagpaker® weighs, fills, settles and closes a 100-lb. bag every 2½ seconds!

WITH THIS engineering marvel at his command, the *one man* in our picture can package from 15 to 25 BPM. And he can *instantly* adjust the rate of speed through the machine's variable drive.

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Stitch," a reinforced two-thread double-lock chain stitch, is standard equipment.

The Model AF Bagpaker is ruggedly constructed of heavy welded steel throughout. Gears are fully enclosed and bathed in oil. Critical parts are of *stainless steel*.

There is a Bagpaker model for every need. They range from the completely automatic Model "A" Bagpaker, capable of packaging up to 60 tons per hour, to small, manually operated economy models.

Whatever your multiwall packaging needs, it will pay you to talk to your Bagpak sales and service representative.



INVENTORY CONTROL

for the

Agricultural Chemical Formulator

by E. S. Heckathorn and R. J. Cardinale

United-Heckathorn
Richmond, California

THE best inventory control available is the ability to sell merchandise when inventories become too large. Unfortunately, the seasonability of agricultural chemicals has never permitted such a policy. Much to the consternation of management; end of month, fire, or clearance sales have not reduced inventories in off-seasons. The consumer will not buy in off-season, even to save money.

If there is an industry that has to have an inventory control to minimize "carrying overstock" or "not having material when needed", it is the agricultural chemical formulation industry.

In the early years, it was simply a matter of having "plenty on hand" for the season. As the number of items increased to gigantic proportions (now totalling better than 500 items), even the smaller formulators found it necessary to have some sort of inventory control; and the larger companies, with rather formal and complicated inventory control procedures, have had to re-evaluate.

To select the proper inventory control procedure, we must consider the following:

Inventory Control Defined

Cost of Inventory

Functions of Inventory Control

Types of Record Keeping

Management Use of Controls

Turnover

Percentage of Value

Time and Dollar Limits

Physical Inventory

Forecasting

Inventory Control Defined

Simply, inventory control is a system we use to have the right type and quantity of material in the right place, at the right time, at the least cost.

Cost of Inventory

Amazingly so, very few in this industry are aware of their actual cost in maintaining an inventory. In establishing a yearly cost, we have the following to consider:

1. *Investment Cost:* Using our average monthly inventory (cost or market), times the rate of interest that we pay on our borrowed capital, gives us the cost of the money employed in inventory. Interest rates vary from 4 to 9%.

2. *Storage-Space Cost:* Since this cost is quite variable, we use a factor of either 4¢ per square foot per month or the actual cost of each warehouse maintained. This approximates about 7% of average monthly value of inventory.

3. *Obsolescence Cost:* This is much higher for the manufacturer than the formulator, but most companies estimate the loss from unusable products at 1% of average monthly value.

4. *Damage and Loss:* Goods in storage that are damaged also have a value of approximately 1% of the average monthly value. Some companies actually estimated from 1½ to 3% due to damage and loss in warehouses.

5. *Taxes:* Personal property taxes are still growing and becoming a more important factor in cost analysis. In California, we can estimate that it will be, roughly, 2% of the average monthly value for a year.

6. *Insurance:* On a widespread inventory, the cost is roughly 1 to 1½% of an average monthly value per year.

A rough analysis of cost of inventory per year could be expressed as from 18 to 25% of an average monthly value. An example for an average monthly value of inventories of \$500,000:

Investment	@6%	\$30,000
Storage @4¢/ft ² /		
month x 12	@11%	55,000
Obsolescence	@1%	5,000
Damage	@1%	5,000
Taxes	@2%	10,000
Insurance	@1½%	7,500
Totals	21½%	\$112,500

No one can deny that inventory costs are an expensive part of doing business.

Other disadvantages include:

- a. High initial cost.
- b. Requires more highly skilled operators than key punch operators or manual posting in Kardex.
- c. Slower than IBM, or card sorting.
- d. Limited tabulation available compared to IBM.

3. *Kardex Systems*: Probably, the most widely used inventory control system is the Kardex file type. There are many variations of this system, ranging from an ordinary 5 x 8 card to special forms, one of which is shown on facing page. The advantages of such a system are the low initial cost and the fact that this system can be decentralized by placing in many locations, such as plants, division offices, branch offices, or even in salesmen's cars. This system is slower reporting than machine type of control, and a great number of clerical workers are required if the system is centralized. If the files are decentralized, very simple reporting to management can be accomplished by copying machines or summary worksheets sent to management once a month.

4. *Charts*: After historical information is available to management, many devices for replenishment are used. One of the simplest, of course, is a table or chart. Replenishment is handled by having two variables on a chart and by a correlation of the two variables, either in graph or table form. The quantities to be required at any one particular time of the year can be readily ascertained.

Probably, the simplest system is a historical graph of sales and inventory, as described in the Dollar and Time Limits section of this paper.

The most popular chart is the linear chart. It has the advantage of making information available from a single

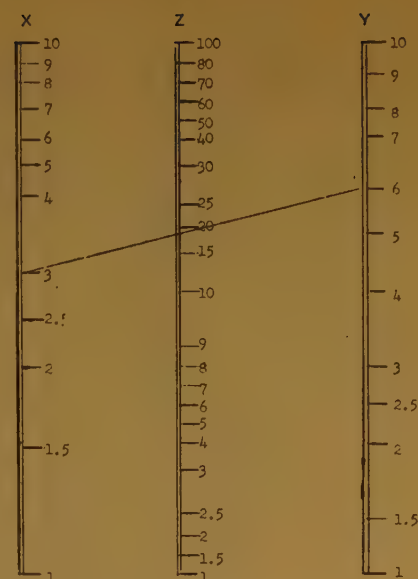
page which otherwise might require numerous sheets of data. These tables, or charts, can be used both as a reorder tool and to plot the total value of inventory. Of course, one of the disadvantages of such charts is that the extreme upper or lower end may be incorrect due to the large scale that has to be used. This can be overcome by using a logarithmic chart, rather than a straight numerical one. The nomograph chart is a form that is particularly useful in solving the formula of the order in quantity. Nomographs sometimes are used as a sort of poor man's slide rule; multiplying and dividing factors are accomplished by drawing a straight line across three or more parallel vertical lines with appropriate scales on them.

After a satisfactory system of inventory record keeping has been established and operating, with information reaching management in accurate, rapid and concise fashion; the question of what management does with the information is probably more important than how they receive it.

Management now has to set rules and policies for the organization to follow and needs techniques to aid in making those necessary decisions.

Management Use of Inventory Controls

Turnover: Turnover is defined as a cycle of depletion and replacement of stock. Turnover is actually a ratio of average monthly inventory to yearly sales; the number of times the dollar value of an inventory is completely exhausted during the year. For example, the company with \$500,000 average monthly inventory doing 5 million dollars in sales has a turnover of 10. The more often a company turns its stock, the less inventory capital is required and the less out-of-pocket inventory costs. The right inventory turnover for a company is mainly a management decision.



Nomograph Chart:

$$XY = Z$$

X—Monthly use of Emulsifier A

Y—Constant % (Predetermined % cost of order)

Z—Economic Quantity Reorder Point

Example: Monthly use 3,000lb (10 drums Emulsifier A), constant order cost 6%; draw straight line between X and Y and read line Z. This figure, translated into pounds, would indicate the economic reorder point to be 1800lb.

Inventory turnover itself can be used as an excellent management control by specifying to branches, profit points, or divisions, the turnover rate within which they are expected to operate. Inventory turnover varies from company to company and industry to industry. Within our industry, turnover ranges from 5 times per year to 25 times; average would be 10 to 12 times per year for smaller regional formulators, and 5 to 6 times per year for the larger companies.

The advantages of a higher rate of turnover of inventory are many; besides the lower out-of-pocket inventory costs such as less space, lower handling costs, savings of interest, taxes and insurance, it actually reflects the efficiency of the planning and financial control of a company. It means newer stock for customer good will, smaller losses in price decline, obsolescence,

(Continued on Page 117)

Raw Material Specification, Nitrogen Loss, Liquid Fertilizers . . . Among Discussions at ACS Fertilizer Section

RAW material particle size is an important factor in the granulation of low-nitrogen-high potash grades of fertilizer, reported E. C. Kapusta, U. S. Borax & Chemical Corp., New York, in addressing the Division of Fertilizer and Soil Chemistry of the American Chemical Society, at the annual meeting in Atlantic City this past September. (A discussion of the reports presented before the Division of Agricultural & Food Chemistry of ACS appeared in the October issue of *Agricultural Chemicals*, pages 38-40). Mr. Kapusta explained that an analysis of problems relating to the granulation of these low nitrogen grades is significant, since such grades constitute over 50 per cent of the tonnage of mixed fertilizers consumed in the mid western region, where granulation has found widest application.

Fertilizer mixtures formulated with large proportions of liquids or highly soluble materials, for example the high nitrogen content grades, are normally very susceptible to granulation. The low-nitrogen grades, on the other hand, which of necessity are usually formulated with a minimum proportion of liquid to solid ingredients, are often granulated only with considerable difficulty. The use of raw materials of a larger particle size reduces the number and surface area of the particles, which must be wetted, and permits more effective utilization of the limited quantity of solution phase available for granulation.

Studies on the effect of muriate of potash particle size were carried out under typical operating conditions in commercial plants employing three different types of systems commonly used in manufacturing

granulated mixed fertilizers: TVA ammoniator plant, pug mill plant, and batch granulation plant. In all tests, economies of plant operation were enhanced by the use of the more coarsely divided muriate of potash products. Sulfuric acid and moisture requirements decreased and lower recycle loads resulted from the use of the coarser muriates; desired production rates were more easily attained and maintained.

The studies further showed that differences in the effect of muriate of potash particle size on process control and operation are less pronounced in pug-mill type granulation units than in rotary ammoniator systems.

Fertilizer products made with coarse muriates are found to be more angular in appearance than the somewhat spherical granules resulting from the use of more finely divided forms of muriate of potash. Uneven distribution of plant foods results when coarse or granular muriates are employed in fertilizer formulation in continuous and batch granulation units. The finely divided muriate resulted in a more uniform plant food distribution, but the fertilizer product contained less than the desired quantity of potash.

David R. Bouldin, TVA Soils and Fertilizer Research Branch, commented on the chemical properties of phosphate fertilizers in relation to granule size effects on availability. He reported that investigations support the hypothesis that plant response to AOAC water-insoluble phosphates is increased as the surface area of the fertilizer in contact with the soil is increased. With the AOAC water-soluble phosphates, plant response to different granule sizes

depends upon total AOAC water soluble phosphate per granule. In the absence of interactions between AOAC water-soluble and water-insoluble phosphates when both occur in the same granule, plant response to the AOAC available phosphorous depends primarily upon the surface area of the fertilizer in contact with soil and upon the AOAC water-soluble phosphate content per granule.

Toxicant Distribution in F-P Mixes

Robert M. Creamer, USDA, Fertilizer Investigations Research Branch, reported that more uniform mixtures result when the toxicant is added as a solution than when added on an impregnated carrier. Mixtures prepared with the pesticide solutions have shown only one-third as large variation in concentration as those prepared with solid carriers. Uniformity of mixtures improves when the fertilizer has a narrow particle size range. He also indicated that variations in mixtures made from screened portions of a fertilizer were only one-half those resulting with the unscreened fertilizer. Stirring a fertilizer during toxicant addition reduced variations to $\frac{2}{3}$ those of unstirred mixtures. Mixture uniformity was not influenced by the nature of volume of the solvent, nor by the rate of addition of solution, he concluded.

The use of fatty chemical conditioning agents to prevent attacking of hygroscopic salts and multi-component fertilizers was reviewed in a paper by R. E. Bearson, M. R. McCorkle, and J. R. Parks, Armour Industrial Chemical Co., Chicago. It was reported that less than 1.0 pounds of fatty chemical per ton of fertilizer treated resulted in free flowing properties of the fertilizer. Many fertilizer applications were said to require as little as .25 to .5 pound conditioner per ton. Some mixed fertilizers which have been successfully coated with the fatty chemical conditioners are: 17-7-0, 14-14-14, 10-10-10, 10-10-0, 15-8-0, 12-12-0, and

What we can do for you—

IN THE FIELD OF FERTILIZERS, INSECTICIDES, OR MATERIALS HANDLING



For 19 years we have followed the white line on just one road—solving engineering production and cost problems in the mixing, grinding and blending of almost any chemical. Pharmaceutical to pesticides. Elevating to bagging. This experience isn't worth anything to us or to you—unless you have a problem, or maybe you have a question to ask. We would like to get acquainted with you—just drop me a line or telephone. Talking is a pleasure and no obligation.

Al Poulsen

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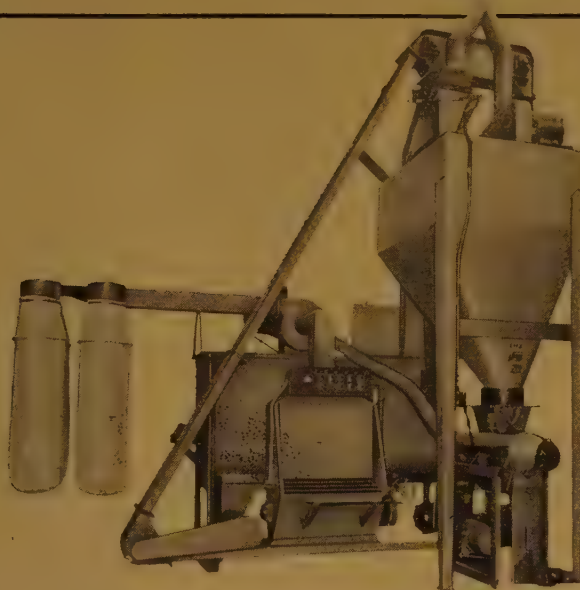
Insecticide plant in California—This is one of the many complete plants in this country and in South America built by the Poulsen Company.

If you want to redesign or relocate

There are lots of new ideas in the chemical mixing field. We can help you redesign or relocate to save space, to secure labor economy, to secure more flexibility, and to reduce other costs. Please ask us for specific examples.

If you need specially designed equipment

You have a special problem. Perhaps you have had it for some time, and this problem requires a special something-or-other to solve it. Tell us the problem. There always seems to be a solution.



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IF YOU MIX, GRIND, OR BLEND—

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**Uni-Blender
solves many problems**

That's what you want—a plant that's *Ready-To-Run—not a plant that requires long engineering, many components from many places, with unknown and untested installation and operating problems.

The Poulsen Uni-Blender is our standard unit. It does almost everything but wind the clock. It mixes, elevates, grinds, and bags. Impregnates liquids with diluent mixes.

If your product deteriorates from long delays in shipping, you want to deliver a *fresh* product...the Uni-Blender can do it!

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This unit can handle six to eight, 1200 to 1500 lb. batches of field strength dust per hour. Other capacities are available.

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15-8-8. The mineral sylvite (KCl) has also been successfully coated with the formulation.

G. L. Bridger, W. R. Grace & Co., reported on the advantages of a pre-reactor for liquid raw materials in mixed fertilizer manufacture. He advised that in most mixed fertilizer manufacturing processes in which liquid as well as solid raw materials are used, the liquid

raw material (ammonia, nitrogen solutions, sulfuric acid, phosphoric acid, and water) are introduced simultaneously into the premixed solid raw materials (usually ammonium sulfate, superphosphates, and potassium chloride). Under these conditions fume is formed by reaction of acid with potassium chloride and ammonia, forming ammonium chloride. Furthermore

ammonia absorption is often not complete. These problems can be overcome by prereacting the acids and ammonia before mixing them with the solid raw materials.

A continuous prereactor, consisting of a compact concentric pipe arrangement, has been developed in which all of the liquid raw materials are premixed and pre-reacted. The prereacted liquid stream is then distributed under the bed of solids, and the free ammonia is completely absorbed by the superphosphates. Fume formation in the liquids-solids mixer is eliminated, and there is negligible loss of ammonia.

The prereactor has been successfully operated in full scale production plants to produce most of the standard grades of granulated mixed fertilizer.

Round Table Features Fertilizer Processing

PRACTICAL problems in processing fertilizers,—is the theme of the 1959 Fertilizer Industry Round Table being held November 4-6 at the Mayflower Hotel, Washington D. C. The program, as in previous years, was arranged by the executive committee, consisting of chairman, Vincent Sauchelli; secretary, H. L. Marshall, Olin-Mathieson Chemical Co.; A. Spillman, Fertilizer Manufacturing Cooperative, Inc.; and James Reynolds, Davison Chemical Co. An outline of the program follows:

Wednesday, Nov. 4

Plant Processes from New Materials to Bagging—discussed by: L. V. Clagg and staff of Canadian Industries; and A. Henderson, Wilson & Toomer Fertilizer Co.

Mechanics of Formulation Calculations—W. J. Tucker, GLF.; J. E. Reynolds, Davison Chemical Co.; H. H. Tucker, Sohio Chemical Co.; and T. R. Schmalz, F. S. Royster Co.

Models Replace Blueprints—W. C. Weber, Dorr Oliver, Inc., will illustrate this report with scale models to show effectiveness of this type equipment.

Thursday, Nov. 5

Problems of Conventional Fertilizers—This section will be reported in two parts: The Mechanical Condition of Fertilizers will be discussed by John Hardesty, USDA, while the Use of Urea-Nitrate Solutions will be discussed by H. H. Tucker, Sohio Chemical Co.; G. R. Gilliam, Allied Chemical Corp.; and J. W. Lewis, du Pont de Nemours Co.

Further reports on Conventional Fertilizers deal with: Segregation: W. L. Hill, USDA, will outline the effect of particle size of raw materials on segregation. The Role of Mixing (rotary and gravity) will be reported by W. Sackett, A. J. Sackett & Co.; R. E. Heffler, Ransom Machinery; R. E. Robinson, Atlantic Utility Works; and H. B. Krueger, Stedman Foundry & Machine Co.

A panel on Semi-Granular Mixtures will include as participants: T. R. Schmalz, F. S. Royster Co.; G. Walton, Tennessee Corp.; J. Sharp, Spencer Chemical Co.; and E. Perrine, Nitrogen Div.

The final session on this day will feature Statistical Quality Control, with comments by Vance Ward, Canadian Industries, Ltd. and Chester H. McCall, Booz-Allen Research.

Friday, Nov. 6

The 1959 Round Table will close with a panel reporting on Pre-Neutralization. Participating will be G. R. Gilliam, Allied Chemical; G. Marburger, Spencer Chemical; P. E. Stone, Virginia Chemical Corp.; F. G. Keenen, du Pont de Nemours Co. and N. K. Alfrey, Davison Chemical Co.★★

Liquid Fertilizer Production

IN several discussions on the production of liquid fertilizers, TVA investigators reported on their studies. Several of these were reviewed previously in *Agricultural Chemicals* (July, page 42 and August, P. 42). Presented at the ACS meeting in this session were: "Liquid Fertilizers from Superphosphoric Acid," by J. A. Wilbanks, M. C. Nason and W. C. Scott, TVA; "Preparation and Properties of Suspension Fertilizers," by J. D. Hatfield, H. K. Walters Jr., and A. V. Slack, TVA.

Researchers from the Grand River Chemical Division, Deere and Co., J. D. Slater, J. S. Hill, and D. C. Sesso, reported on the determination of total nitrogen and nitrogen distribution in fertilizer solutions. They noted that during the blending or formulation of high nitrogen fertilizer solutions containing more than one compound as a supplier of nitrogen, it is necessary that the concentration of all nitrogen-containing compounds in the solution, as well as the total nitrogen content, be quickly and accurately known.

The method they discussed for
(Continued on Page 87)

The **AGRICULTURAL**

Applicator

- NATA To Meet In New Orleans
- Forest Spraying In Canada
- Home Made Spray Rig
- Flying Tractor
- International Aerial Show
- TAAA Meeting in Orange, Texas



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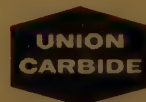
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AGRICULTURAL CHEMICALS



Aerial Forest Spraying In Canada

THE special advantages of the aerial application method against forest insects have been apparent to forest entomologists both on the North American continent and in Europe since early in the development of the airplane. A small dusting experiment was carried out against an insect called the Catalpa Sphinx nearly 40 years ago in Ohio, and in Canada the first spruce budworm aerial dusting project was carried out over 30 years ago in Nova Scotia. Full-scale use of the method, however, has been a development of the last 15 years, following the advent of DDT and the concomitant development of suitable apparatus and techniques for obtaining adequate coverage with highly concentrated toxicants. In Europe, where operations even now seldom exceed a few thousand acres, dusting remains the most frequently used technique, whereas practically all large-scale forest operations in the U. S. and Canada since World War II have employed DDT-oil solutions emitted from the boom and nozzle type of spray apparatus.

Eleven forest insect problems have been combatted by the aerial method in the U. S. since 1945. This is exclusive of gypsy moth spraying which has been carried

by **F. E. Webb**
Forest Biology Laboratory
Fredericton, N. B.

out more or less continuously during this period in New England and adjacent eastern states and which has involved over 4 million acres since 1954 in attempts at eradication in parts of New Jersey, New York, Pennsylvania and Michigan. Operations against forest insects total over 10½ million acres, mostly at an emitted dosage of 1 lb. DDT per acre. Of that total, 9.7 million acres, or 92%, has been against spruce budworm, chiefly in the Pacific Northwest and Rocky Mountain regions.

In Canada, the method has been used against four forest insects. In British Columbia, operations were carried out against the western hemlock looper in 1946, the false hemlock looper in 1948 and the black-headed budworm in 1957. Altogether, these western operations totalled 179,000 acres. Compared with this, spruce budworm operations in Eastern Canada have been carried out over a total of almost 18 million acres, almost all of this in the 1952-58 operations in New Brunswick and

Lower St. Lawrence-Gaspé regions of Quebec. Coincidentally, U. S. and Canadian budworm operations to date carried out almost entirely on opposite sides of the continent, have involved the use of nearly equal amounts of insecticide — between 9 and 10 million lbs. of DDT in each case, applied mostly at 1 lb./acre in the Western U. S. and at ½ lb./acre in Atlantic Canada.

Spruce Budworm Operations

It will be obvious from the foregoing statistics that the development of the aerial application method on this continent has been overwhelmingly influenced by the requirements of a single pest problem — that of the spruce budworm. This has been especially so in Canada, where the spraying method received its first full-scale test against this insect in 1945 and 1946 in the Lake Nipigon area of Ontario. These first tests proved somewhat inconclusive from the point of view of economic practicability and long-term benefits to the forest, but they demonstrated the remarkable immediate effectiveness of DDT when carefully applied against a forest defoliator at the rate of 1 lb. DDT in 1 gal. oil-solvent per acre. Biological studies also indicated that single

Presented at the annual convention of the Canadian Agricultural Chemicals Association, Quebec, P. Q., Sept. 22, 1959.

applications at this dose would be unlikely to cause severe or lasting effects to the fish and wildlife indigenous to the region.

An Ontario Dept. of Lands and Forests Bulletin, describing operational and biological aspects of these tests, provided essential baseline information for the planning of subsequent tests and large-scale projects on both sides of the border. The ability of established aerial applicators to carry out exceptionally large-scale operations in rugged forest terrain at a reasonable cost was proved soon afterwards in the series of large-scale operations in the Pacific Northwest beginning in Oregon and Washington in 1949. In seven years these operations covered nearly 4 million acres at one lb. DDT per acre at an average cost of \$1.05 per acre.

Full-scale budworm operations were not commenced again in Canada until 1952, but a program of intensive biological research relating to the method was carried out by the Division of Forest Biology of the Department of Agriculture in cooperation with the Defense Research Board in the Kenora area of Ontario in 1951 and 1952. Among the more important results, these tests demonstrated the screening effect of foliage on a drifting spray cloud, the closer dependence of mortality on droplet density than on spray volume or droplet size and something of the relation between spray effectiveness and the stage of larval development at which the insecticide is applied.

My own association with aerial forest spraying has been in connection with biological assessment of the spruce budworm operations carried out in New Brunswick since 1952. These, combined with operations in adjacent areas of Quebec since 1954, have been by all odds the largest ever undertaken. In the seven years from 1952 to 1958, 9¾ million gallons of DDT-oil solvent formulation (1 lb. DDT in 1 U.S. gallon) were sprayed over a net area of 9.3 million acres. Including respraying, total operational acreage was nearly 18 million

acres. Aircraft fleets for spraying and observation varied from 22 in 1952 to over 200 in 1957 when the largest operations of all were carried out, totalling almost 6½ million acres.

The hitherto standard dosage against forest defoliators of 1 lb. DDT per acre was used in the first year only; since that time, average emitted dosage has been halved by the simple expedient of doubling

"Severe or lasting damage to wildlife is unlikely from the low dosages of insecticides that are sufficient for a high percentage kill of pest populations. In any event, damage to wildlife would be unlikely to match the disruptive effect on the forest community of allowing widespread severe spruce budworm damage to go unchecked."

the average distance between flight lines. A total of 22 bush airstrips were constructed, 15 in New Brunswick and seven in Quebec and additional use was made by spray aircraft of municipal airports at Fredericton, Rimouski, and Gaspé. Except in the earliest years, costs have averaged less than one dollar per acre; total expenditures amounted to almost 15 million dollars, or an average of 83-84 cents per acre. One estimate of this in terms of New Brunswick forest economics is that it represents a charge of 10 to 15 cents a cord of standing timber or an additional production cost of between \$1.00 and \$1.50 a cord for pulpwood cut from the area during the period.

Organization and Financing

Operational aspects of these operations have been the responsibility of Forest Protection Ltd. representing the Province and the four main pulp and paper companies in New Brunswick, and Quebec Forest Industries Assoc., representing timberland owners and lessees in Quebec. Two-thirds of the cost has been shared between the Province and Industry in New Brunswick, the remainder by the Federal Department of Northern Affairs and

National Resources. Costs in Quebec have been shared between the Province and Industry.

The role of the Division of Forest Biology in the operations in the Atlantic area and, indeed, in Canada generally is to provide technical advice and assistance with respect to biological and operational phases of the work, to study results, and to appraise the long-term benefits and potentialities of the method as a tool in forest management. Dr. J. R. Blais is directly responsible for this work in Quebec as I am in New Brunswick. A continuing program of research on toxicology, dosages and the problems of application against this and other forest insects is undertaken by the Chemical Control Section of this Division under Dr. J. J. Fettes in Ottawa. The responsibilities of the Division with respect to chemical control measures, however, do not involve any regulatory authority.

Information on current conditions and forecasts of impending outbreaks are provided in all 10 Provinces through the organization of the Forest Insect Survey. In particular situations, estimates are made of the probabilities of forest damage as a basis for providing consultative and advisory services on the need for, and the methods of conducting commercial control operations. However, decisions to undertake such measures rest with owners and operators of timberlands, while the organization, financing and execution has been the responsibility of special groups set up to represent the owners and operators.

Spraying Policy

In assessing the need for chemical control, a consistent policy has been followed by this Division of considering treatment to be warranted only when the threat of further severe attack would seriously threaten the life of trees. This is in contrast to the concept of eradication that has been adopted against the gypsy moth, for exam-

(Continued on Page 110)



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Versatile, Home Made Spray Rig

by

Thomas A. Dickinson

AN unusual spray rig, recently constructed and currently being operated by the Redlands Farming Co., Redlands, Calif., is said to be exceptionally resistant to damage in orchards and is extremely versatile.

Its versatility is such that the rig can be used to water young trees and to fill oil-burning heaters, in addition to being suitable for either manual or boom spray work on as many as 55 acres of land per day. The latter applications are important to Redlands Farming because the company maintains a pest-control program as part of a large general-purpose growing operation.

According to Robert B. Break, veteran pest control operator who manages Redlands Farming, the primary objective in designing the new rig was to eliminate damages normally incurred where booms on weed spray equipment hit tree limbs, boulders, and other obstacles. This was accomplished simply by providing the rig's two booms with hinge and swivel mountings in such a way that they will give instead of breaking whenever they come in contact with solid objects.

Spring tension is used to maintain the normal horizontal alignment of the booms, which receive fluids from the rig's storage tank via flexible hose lines. Where spray work can only be done by manual means, both booms can be folded

up out of the way against the sides of the rig.

Mr. Break and his assistants made the new spray unit self-propelling by mounting its components on the stripped-down framework of a 1936 Ford truck, and were able to hold their gross construction costs to about \$1000 by making extensive use of second-hand spray components.

For example, a 400-gallon tank from an old Hardy spray rig (worth about \$25 as junk) was mounted on the chassis for fluid storage purposes; a used 5-horsepower Wisconsin engine (bought for \$85) was installed to provide pumping power; and an ancient gear pump (which somebody happened to find on Redlands Farming's property) was added along with a gate valve to permit use of the rig in filling heaters and watering young fruit trees.

The only new part of any significance that had to be purchased was a ¾-inch Hypro pump with replaceable polyethylene impellers. Its purpose is to provide pressure for either manual or boom spray work.

For the chemical control of weeds, Redlands Farming currently employs such compounds as Karmex at the rate of about 1½ lbs. per acre. Despite the fact that this spray rate is well below allowable maximums, Mr. Break claims the applications are better than 90% effective.★



Jess Contreras, an employee of Redlands Farming Co., shows how readily one of the booms on the spray rig can be moved. Second boom (at left) is folded back against the side of the rig.

FIVE or six years ago, there was a great deal of discussion among aerial applicators on the subject of flying tractors, inspired no doubt by an article in the March 1953 issue of *Aviation Age*. The article, "We Want A Flying Tractor", by A. L. Baxter of Yakima, Wash., was a good one, and even inspired some people to try to build a flying tractor.

It is not the purpose of this article to say that a flying tractor cannot be built, it can. But a tractor was made to pull things along the ground and not through the air. In addition, a tractor never will satisfy the aircraft requirements of the Federal Aviation Agency.

It is relatively easy to write what is needed in an agricultural aircraft, but it is a little more difficult to build the machine so that it will profitably meet the wanted requirements. The problems inherent in any airplane design are complex, but they are compounded in an airplane intended for aerial application because of the conflicting requirements of ruggedness and light structural weight, high agricultural payload and strength, safety and economy, and refinement and low cost.

The airplane designed for the aerial applicator is a breed all by itself, with its own special problems. The workhorse capability of the tractor must be combined with the flyability of the airplane without compromising either of the machines.

The problems faced by any airplane manufacturer who has the fortitude (and money) to enter the ag-airplane field are numerous. He must determine the size of the airplane, design it, build it, test fly it, and equip the airplane with distributing systems. Then, the type design must be certified, production lines set up, and the airplane must be field tested. After this, the machine must be sold to the user. The success of the manufacturer, of course, will be shown only by the customer's acceptance of the final product.

Let us examine some of the problems a little closer. In an airplane, weight is of great concern. It is easy to see that the larger the engine, the more weight that can be flown into the air. The engine determines, within limits, the maximum airplane weight. Too big an engine is bad from the economy viewpoint. Too small an engine also may be uneconomical, however, because of the size of areas to be treated. In any event, when the engine is chosen,

of the airplane, it is found that the structural weight may be near one thousand pounds and the profit-making one hundred pounds now is ten per cent of the weight that can be worked with. It takes a lot of close shaving to reduce the structural weight by ten per cent without reducing the ruggedness so necessary in an agricultural airplane. Tractor castings, therefore, would be the first things to go.

Another major problem in ag-airplane design is the dispensing

Do Applicators Want A Flying Tractor?

By Joseph Lippert, Jr.

the maximum weight of the airplane is fixed.

The maximum weight of an airplane is the sum of the following: the basic airplane and distributing equipment; fuel and oil; the pilot; and the agricultural payload. The agricultural payload is, of course, of primary interest to the ag-operator. When it is considered that ten per cent of the payload can represent the profit making portion of each flight, and it is assumed that the airplane can carry a thousand pounds, it is evident that a hundred pounds of extra payload becomes very important. One hundred pounds represents approximately three per cent of the total weight of the airplane.

On first glance, it would seem that, by a little closer design, it should be relatively simple to save three per cent of the weight of an airplane. However, much of the airplane's weight consists of fixed weight items, such as the engine, propeller, landing gear, and agricultural dispensing equipment and controls. When these items are subtracted from the empty weight

equipment. At least half of this problem is the determination of the performance required of the equipment. Unfortunately, there are widely varying requirements for various sections of the country. Certain sections predominantly call for spray operations, others almost exclusively require dusting operations. Spray equipment capacity requirements run from one to 100 gallons per acre and the capacities of dusting equipment run all the way from one to 1,000 pounds per acre. Anyone familiar with dispensing equipment will agree that it is difficult, if not impossible, to provide equipment that will apply chemicals with any degree of uniformity at both the high and low volume rates.

The other half of the equipment problem lies in the procuring of the equipment, although this problem is diminishing as the demand for better equipment is beginning to be felt by the suppliers of such hardware. Much of this equipment, unfortunately, is heavy. Particular care must be exercised in the selection of such equipment

(Continued on Page 110)

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Wing span.....	35 ft. 8 in.
Over-all length.....	24 ft. 4 in.
Maximum height.....	10 ft. 9 in.
Maximum gross weight.....	3700 lb.
Fuel.....	34 gal.
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Meeting Program

THURSDAY, NOV. 12

- 12:00 noon **Registration** — Hotel Lobby
 6:30 p. m. **"Meet-Your-Friends" Cocktail Party and Dancing** — Ballroom
 11:30 p. m. **"Sober-Up" Breakfast** — Ballroom

FRIDAY, NOV. 13

- 10:00 a. m. **Business Meeting** — M. C. Tedder Presiding—South Ballroom
 12:30 p. m. **Ladies Luncheon and Fashion Show**
 2:00 p. m. **Resume Business Meeting**
 Speaker: *Richard D. McNally*, Managing Editor, **Agricultural Chemicals Magazine**
 Subject: "Good Public Relations for Aerial Applicators"
 7:30 p. m. **Native Catfish Dinner** — Entertainment

SATURDAY, NOV. 14

- 10:00 a. m. **Business Meeting** — South Ballroom
 12:30 p. m. **Luncheon** — Ballroom
 Speaker: *James S. Bates*, Member, House of Representatives
 Subject: "How Your State Legislature Operates"
 2:00 p. m. **Business Meeting** — Ballroom (General Discussion — Needed Legislation. Election of Officers)
 7:30 p. m. **Annual Banquet** — Entertainment

TAAA Meets Nov. 12-15

THIS year's meeting of the Texas Aerial Applicators Association, being held Nov. 12 to 15 at the Orange House in Orange, Texas, will be the first four-day meeting ever to be held by that organization. Another unique feature of this year's meeting is that the business sessions are scheduled to start at 10 a.m., one hour later than customarily has been the case.

Business meetings are planned for the 13th and 14th of November and will feature a forum on legislative and agricultural matters at the state level. Other sessions are scheduled to be devoted to the public relations problems of applicators, needed legislation, and the election of officers for 1960.

(Continued on Page 74)

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Applicator Sessions

TUESDAY, NOV. 17

- 8:15 a.m. **Applicator Breakfast**
- 2:00 p.m. **Public Relations for Applicators**
Lloyd Nolen, NATA vice president,
 Agriculture.
 Representative of NACA (to be
 announced)
- 4:00 p.m. **Business Opportunities Panel**
Ralph Dorland, *Agricultural Chem-*
icals magazine, moderator

WEDNESDAY, NOV. 18

- 10:00 a.m. **Applicator Safety Session**
Jay McCausland, FAA Agriculture
 Specialist.
 Representative of ARS, USDA (to
 be announced)

THURSDAY, NOV. 19

- 2:00 p.m. **Informal Discussion Period**
- 7:30 p.m. **NATA's 20th Annual Banquet**



Hotel Monteleone

SESSIONS of interest to aerial applicators will be held throughout the 20th annual convention of the National Aviation Trades Association being held in the Hotel Monteleone, New Orleans, La., Nov. 16 to 21.

Starting with an Applicator Breakfast on Nov. 17, the convention's first day of general sessions, there are a total of five sessions planned exclusively for applicators, over and above the general NATA business meetings, which are of interest to all members.

The National Agricultural Chemicals Association will be represented by an authority on public relations who will discuss an effective public relations program for applicators and will list ways in which the NATA and the NACA can unite their resources to effectively combat the poor press usually received by large-scale spray programs. Also in the public relations meeting, Lloyd Nolen, NATA vice president for agriculture, will present a color-slide film presentation which he has been giving to civic clubs and farm groups in the vicinity of his spraying company's operations. The presentation is said to

NATA Meeting in New Orleans

go a long way towards relieving any anti-spraying feeling on the part of his customer's neighbors.

In a session devoted to government relations with aerial applicators, a representative of the Civil Aeronautics Board will report on aerial applicator accidents and make recommendations for improving the accident record. Preliminary plans did not specify who the CAB representative would be, but it reportedly will be either Oscar Bakke or Russell Abbott.

J. A. McCausland, agricultural aviation specialist of the Federal Aviation Agency, will speak on applicator regulatory proposals. Also scheduled to address the government relations session is Kenneth Messenger of the U. S. Department of Agriculture's Agricultural Research Service, who will discuss contract program improvement.

At an agriculture luncheon on Nov. 19 a discussion is planned for the subject of government agricultural contracts.

The election of officers for the Applicator Division of NATA also will be held on the 19th and will be followed by an open, informal discussion period to cover any subject of interest that may come up during the course of the convention.

The panel on "New Business Opportunities for Applicators" is to be comprised of representatives of agricultural chemicals manufacturing firms. Robert Z. Torrence, E. I. du Pont de Nemours & Co., will discuss the aerial application of urea fertilizers and H. E. Meadows, Diamond Alkali Co., will talk about the possibilities of applying granular 2,4-D from the air.

Also scheduled to be on the panel are: F. L. Bailey, General Chemical Division, Allied Chemical Corp.; Roger W. Roth, Velsicol Chemical Corp.; C. Harold Cunningham, Rohm & Haas Co.; John W. Keys, Union Carbide Chemicals Co.; and John Plowden, Geigy Agricultural Chemicals.

Spray Demonstration Features International Aerial Equipment

MORE than a dozen aircraft took part in the aerial spray demonstration held Sept. 18 at Cranfield, England, in conjunction with the first International Agricultural Aviation Conference which was sponsored by the European Agricultural Aviation Centre, the British Ministry of Agriculture, and the British Ministry of Transport and Civil Aviation.

The Agricultural Aviation Co., Ltd., Panshanger Aerodrome, Hertford, displayed a De Havilland 82A Tiger Moth which it has converted for agricultural duties. A feature of this aircraft is the boom, which is attached to the wing by tear-away links so that it will fold back without damaging the aircraft should it foul an object during the spray run. The boom is a corrosion-resistant mild steel tube of streamlined section and 34 nozzles are fitted along the 30 foot span. The spray unit is capable of delivering up to 12 gallons per acre at this pressure. Normal output is $3\frac{1}{2}$ gallons per acre.

Airspray (Colchester) Ltd., Boxted Airfield, Langham, Essex, exhibited the Jackaroo Crop Sprayer, in which a 60 gallon spray tank is fitted in place of the two right-handed seats of a standard Jackaroo. A Stuart-Turner centrifugal pump drives spray-fluid from the tank to two under-wing Allman 15 foot booms equipped with 15 Allman nozzles. Instead of nozzles, atomizers may be attached to the booms so that only external piping need be used on the airplane.

The Kolibrie, said to be the first helicopter designed chiefly for agricultural use, was flown by European Helicopters Ltd., Ipswich, Suffolk, importers and distributors of the Kolibrie for the United Kingdom. A ramjet heli-

copter, the Kolibrie provides a swath width of 66 feet and can cover upwards of 75 acres per hour.

Farmair Ltd., Oxford Airport, Kidlington, Oxfordshire, put the Piper PA-18-A through its paces. The company had planned to demonstrate the Piper Pawnee but reported that it was not available because of the steel strike in the United States. The new Brantley helicopter also was absent from the show for the same reason.

The Auster JIB was shown by Fison-Airwork Ltd., Airwork House, London. The Auster JIB was equipped with Fison-Airwork's newly-developed rotary-driven fertilizer distributor, now in the process of being patented. The distributor is fed from a four cwt. hopper mounted behind the pilot's seat and is operated by a wind-driven fan which actuates rotating vanes. The spreader can cover a 100 foot swath at 65 miles per hour from a height of 20 feet.

Auster Aircraft, Rearsby, Leicester, was on hand to exhibit its Workmaster and Agricola aircraft. The Workmaster is Auster's latest agricultural aircraft and is equipped with a 180 h.p. Lycoming engine and has an 80 m.p.h. operational speed. Other features are a double-thickness windscreen and low-pressure, oversize tires. The Agricola was designed specifically for aerial farming duties and has high-load capabilities.

De Havilland Aircraft of Canada, Ltd., Hertfordshire, England, exhibited the Beaver, a Canadian general transport "bush" aircraft fitted with spray equipment. With a standard tankage of 200 Imperial gallons, the Beaver has one of the highest work outputs of any machine in the agricultural field. The machine at Cranfield was equipped

with two Britten-Norman "Spray-packs", a self-contained spray unit, one of which was mounted under each wing, containing its own pump and Micronair Spraygear.

The Prospector, formerly the EP.9, was demonstrated by Lancashire Aircraft Co. Ltd., Lancashire. Designed specifically for agricultural spraying, dusting, and seeding, the Prospector can be adapted for other off-season duties, such as aerial survey, six-seat transport, and supply dropping.

A Yugoslavian airplane, the L-60 Brigadyr built by Omnipol of Prague, was shown by its distributors, Aircraft & General Finance Corp., Ltd., London. The L-60 is a general purpose, high wing aircraft, powered by a 220 h.p. Praga Doris flat, six-cylinder engine driving a variable pitch propeller. The agricultural version is intended for liquid or powder spraying and has a hopper of 69 gallons capacity installed in the fuselage. The spraying equipment is operated by engine-driven pumps and can discharge up to 660 pounds of powder or 66 gallons of liquid per hour.

The Hiller Aircraft Corp., Palo Alto, Calif., was represented by its British agents, Helicopter Sales, Ltd., London, who demonstrated the new Hiller UH 12-E three place helicopter powered by a 310 h.p. Lycoming VO-540-AIA engine.

Britten-Norman Ltd., Isle of Wight, sponsored a demonstration of its Micronair rotary system atomizer, a low-volume spraying apparatus designed specifically for aircraft use. The use of the Micronair enables the operator to select the optimum size of droplet for the treatment in hand.

Among other exhibitors at the demonstration were: Dow Agrochemicals Ltd., London, showing Dowpon, a systemic grass, weed, reed, and bracken killer for aerial application; Packer Pressure Equipment Co. Ltd., Bexhill-on-Sea, Sussex, who presented its Packa portable high-pressure greasing equipment for use on all types of farm

(Continued on Page 110)

PEST ROUNDUP

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in U.S.D.A.'s pest surveys throughout the U.S.

By Kelvin Dorward



Corn Earworm Active On Soybeans During September

THE corn earworm was very active on soybeans in several states during early September. The outbreak in the eastern counties of Virginia was quite general from the North Carolina line to King George County. In Westmoreland County, Virginia, the outbreak was one of the heaviest ever experienced. Seventy-five percent of the 5,000 acres of soybeans in the county either received or needed treatment. Corn earworm infestations were building up on soybean pods on the Eastern Shore, Maryland, by the middle of September. Some late fields were heavily infested.

The corn earworm was a major problem on soybeans in Richland, Calhoun, Orangeburg, Florence, Clarendon, Allendale, and Darlington Counties, South Carolina. Heavy infestations of soybeans were also reported from Baldwin County, Georgia. Moderate infestations were reported from the same crop in St. Clair County, Alabama. Stripping of soybean leaves by the corn earworm was noted in Jones County, North Carolina.

Alfalfa was damaged by the earworm in the El Centro area of Imperial County, California, and damage to sweet corn in the Corvallis area, Oregon, was greater than in past years for the same period. In Missouri, late grain sorghums throughout the State were damaged.

Soybeans also were damaged in several areas by the velvetbean

caterpillar during September. The insect caused severe damage in Mobile, Henry, Chilton, and St. Clair Counties, Alabama. In Georgia, heavy infestations on soybeans were found in Baldwin County and damage was on the increase by the middle of September in Dorchester County, South Carolina. Damage also was recorded in several other South Carolina counties. The velvetbean caterpillar damaged about 50 percent of the soybean pods in Lenoir, Johnston and Wayne Counties, North Carolina.

Although no serious outbreaks of the spotted alfalfa aphid were reported during September, the pest was widespread and building up in certain areas. Adults and nymphs of the aphid were found on September 22 in Morrow and Umatilla Counties, Oregon, for the second consecutive year. The insect was found in Wheeler County, for a new county record and more new county records are expected as the survey progresses. This year's distribution in Oregon is expected to exceed that of last year. Infestations were very light in southern Nevada. In Utah, the spotted alfalfa aphid was considered to be generally distributed throughout the state even though it had not been collected in all counties.

Spotted alfalfa aphid populations were increasing on susceptible varieties of alfalfa in Arizona but, in general, populations over the State remained low. Populations were building up in many

alfalfa fields in Chaves and Eddy Counties, New Mexico. Counts were light in counties reporting from Colorado, Oklahoma, Texas, Arkansas and Missouri. In one alfalfa field in Chase County, Kansas, damage was estimated at 10 percent, with spotted alfalfa aphid populations of over 400 per net sweep. The highest populations in Nebraska, up to 150 aphids per sweep, were reported from the counties in the Republican Valley. Populations decreased to the east, with infestations found in only 20 percent of the fields in eastern Nebraska and none in the north-eastern counties. The spotted alfalfa aphid was found in Indiana September 22 for the first time in two years. Specimens were found only in the Ohio and Wabash river valleys and counts were low.

The meadow spittlebug has been on the increase for the past several years in Indiana. The 1959 infestation was apparently the highest on record for the State, with high counts in the eastern portion and epidemic status being reached in the southwestern area. By applying a formula of loss of 10 to 12 pounds of forage per acre per spittlebug per square foot, not to exceed one ton per acre, it was calculated that the spittlebug caused a loss of over \$13,000,000 to the alfalfa and clover crops of Indiana in 1959. In a large part of northwestern and southwestern Indiana, populations did not justify control and the loss was calculated to be \$850,365, and the preventable loss was figured at \$12,191,880.

(Continued on Page 114)

New Dispersal Equipment For Use on Helicopters



New crop spraying equipment for helicopters is shown in action for the first time. Designed by the Agricultural Aviation Engineering Co., the system's spray tanks have a capacity of 150 gals. It is shown in use on a Hiller UH-12E helicopter.

The Agricultural Aviation Engineering Co., Santa Clara, Calif., has developed a new dispersal system especially for use on the Hiller Aircraft Corp.'s UH-12E helicopter.

The spray tanks have a total volume capacity of 150 gallons and are made of lightweight fiberglass reinforced plastic. Designed for trouble-free operation, the equipment may be dismantled in minutes by the removal of quick-release pins. The spray booms are foldable to permit immediate over-the-road transportation or storage.

The system is powered by a Pickell spray pump which is belt-driven from an engine driven power-take-off arrangement. The Agricultural Aviation Engineering Company recently merged with Pickell and Associates, a manufacturer of agricultural aviation equipment.

A feature of the system is that the spray tanks are so constructed that they can be used with a boom-type dry material dispersal system currently being developed by Agavenco.

TAAA MEETING

(From Page 69)

Corley Tedder, president of the Texas Aerial Applicators Association, will preside at the business meetings. Among the speakers will be James S. Bates, member of the Texas House of Representatives, who will describe the operations of the State Legislature. Richard D. McNally, managing editor of **Agricultural Chemicals**, will talk about ways in which aerial applicators can improve their relations with the press on both the local and national levels.

Registration for the meeting will begin at noon on Nov. 12 and the Association's annual banquet will take place on the evening of Nov. 14. Among the social events scheduled are a ladies luncheon and fashion show and a native catfish dinner.

Hardwood Spraying Increases

The Louisiana Aerial Applicators Association reports that the application of hardwood herbicides from the air for pine release was done on a much larger scale in that state last season than ever before. Also, the use of aircraft for direct pine seed broadcasting has increased greatly.

One company, Louisiana Flyers, Lake Charles, La., alone accounted for the aerial seeding of 20,000 acres during the past winter season.

Much work is being done by aircraft in Louisiana to prevent the spread of fire ants, and a USDA bid invitation recently was sent out covering spraying for the insect carrier of Hoja Blanca, a new rice disease imported from Cuba.

Accident Prevention Program

The Federal Aviation Authority and the Civil Aeronautics Board have approved the participation of the California Agricultural Aviation Association in the investigation of agricultural aircraft accidents. The CAAA is to be represented at investigations by designated members of its Safety Committee.

According to the CAAA, this should help reduce the number of aircraft accidents in the industry, because the Safety Committee can gather accident information which can be published and distributed as safety bulletins to all operators. Under the provisions of the FAA act of 1958, the FAA has no authority to participate in the determination of probable causes of accidents.

The Safety Committee will omit in the safety bulletins any reference to owner, pilot, or operator names, registration numbers of aircraft, or any reference to any particular person, company, or organization. The CAAA said that it is not the purpose of the investigation either to point a finger of guilt or to embarrass any individual, company, or organization, but rather, it is to determine unsafe practices that can be used in agricultural aircraft accident prevention.

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LISTENING POST

By Paul Miller



This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Chemical Control of Nuisance Growths on Greenhouse Benches

O. D. Morgan* of the University of Maryland Agricultural Experiment Station writes that growth of some kinds of algae mosses, and fungi over soil benches, and pots is a nuisance in experimental greenhouses and must be removed every once in a while. With the usual methods of control, including steaming, fumigating, or replacing the old soil completely, the growth soon reappears. Many greenhouse experiments are run for several weeks or months and lasting control of these nuisance organisms would be helpful in studies that take a long time for completion.

Copper sulfate and chlorine are used to control similar growth of algae in water, but these chemicals are injurious to many plants and thus are not safe to use in greenhouses. Various other chemicals, including some fungicides, have been shown by different workers to be effective at relatively low rates in reservoirs and ponds.

During experiments on the control of certain soil-borne pathogens the author found that a number of fungicides applied to the soil as drenches controlled the nuisance organisms as well as the pathogens that he was studying. The most effective of these fungicides for nuisance growth control

were chemical 5400 (alpha,alpha-trithiobis - (N-dimethyl-thioformamide)) and dichlone. In preliminary tests, both materials gave control lasting for several weeks. Of all the fungicides tried, chemical 5400 had the longest residual effect.

Steam had been employed to control the nuisance growth in the greenhouses, but its use necessitated prior removal of the buried heating cables from the benches. When it was found that chemicals

might be useful, experiments were planned to determine the effectiveness of the two most promising ones, chemical 5400 and dichlone.

Materials and Methods

Three separate tests of the efficacy of the chemicals were made.

First Test: Sand in two large (4×25-foot) benches was drenched with chemical 5400 twice each winter for 3 years. The sand in the benches was not changed during the whole period. Dichlone was similarly tested for 1 year. Both materials were used at the rate of 2 pounds of the 50-percent wettable

(Continued on Page 113)

Table 1
The effect of chemical 5400 and of dichlone at several concentrations on the control of algae on the surface of sand in 2-inch pots^a.

Time (weeks)	Concentrations of chemicals (ppm)												Check
	50		100		200		400		800		1200		
	A ^b	B ^b	A	B	A	B	A	B	A	B	A	B	
1	0	0.4	0	0	0	0	0	0	0	0	0	0	3.0
2	0	1.8	0	1.0	0	T	0	0	0	0	0	0	5.0
3	T	3.1	0	2.5	0	1.0	0	T	0	0	0	0	5.0
4	1.0	4.4	T	3.3	0	2.6	0	0.8	0	0	0	0	5.0
5	2.4	5.0	1.9	4.0	0.8	4.3	0	1.6	0	0.5	0	T	5.0
6	4.3	5.0	3.8	4.0	1.5	5.0	T	3.8	0	2.3	0	1.5	5.0
18	5.0	5.0	5.0	5.0	4.0	5.0	1.0	5.0	0	3.6	0	2.2	5.0

^aGrowth index increments were 0=none, T=trace, 1=20 percent of sand covered, 5=100 percent of sand covered with a heavy growth of algae.

^bA=Chemical 5400. B=Dichlone.
(Table from Morgan, see footnote 1).

Table 2
The effect of chemical 5400 and of dichlone at several concentrations on control of moss on greenhouse pots.

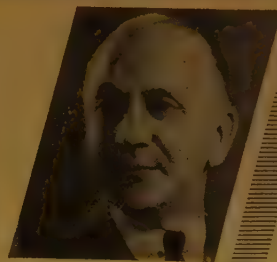
Rate (pounds per 100 gallons)	Percentage of moss killed after 6 weeks	
	Chemical 5400	Dichlone
2	86.3	32.5
1	50.0	0
1/2	20.0	0
1/4	7.0	0
None	0	0

(Table from Morgan, see footnote 1).

*O. D. Morgan, "Chemical control of algae and other nuisance growths on greenhouse benches, pots, and potting soil," *Plant Disease Reporter*, vol. 43, no. 6, pages 660-663, June 15, 1959.

Fertilizer Views and News

Dr. Vincent Sauchelli



Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

Organic Fertilizer No Longer Needed on Tobacco

FERTILIZERS high in organic nitrogen of plant or animal origin are not necessary for the production of a high yield of good quality tobacco."

This positive statement appears in Bulletin 613 of the Connecticut Agricultural Station issued early this year. It is extraordinary in many ways. For upward of 65 years this station has carried out field tests on the fertilization of tobacco. During this period and up to the issuance of this bulletin, most growers and particularly buyers of Connecticut Valley tobacco had insisted that organic nitrogen materials should be used exclusively in their tobacco fertilizer formulations. Expensive soil seed meals—cotton seed meal preferably—were specified as the sole suppliers of fertilizer nitrogen, because only such were capable of producing the required quality. This same attitude had at one time been shared by the tobacco growers in other tobacco areas of the country and in Canada, but gradually they accepted less expensive forms represented by the inorganic, water-soluble nitrogen salts. The Connecticut Valley growers held strongly to their convictions until the advent of the cheaper synthetic cigar binder. As usual, in all similar situations, the force of economics dictates the means. Organic nitrogen fertilizers are too expensive. Premiums for certain alleged qualities in binder type tobacco could no longer be paid once synthetic binder was accepted by the cigar trade. The cost of producing such tobacco had

to be reduced. Oil seed meals and other high-cost organics became casualties.

What has happened in the Connecticut Valley tobacco areas is merely a repetition (though long delayed) of the history of organic materials used in the fertilizer industry. Up until the first World War about 90 per cent of the nitrogen used in the manufacture of commercial fertilizer mixtures was derived from organic sources. At present, the total amount of organic nitrogen used in mixed goods in the United States averages about 4 per cent. Chemical nitrogen materials in the form of ammonia, urea, ammonium nitrate, ammonium sulfate, cyanamide, sodium nitrate and nitrogen solutions comprise the chief sources. They are considerably less expensive per unit of nitrogen and completely satisfactory. The organic materials used formerly in fertilizers—oil seed meals, fish meal, dried blood, meat scrap—have gone to the livestock mill feed industry, which could better afford to use them.

In the Southeast, flue-cured tobacco areas the type of fertilizer used was for years that recommended by The Agronomy Tobacco Work Conference. This group continued to specify the use of water-insoluble nitrogen at first for one third, then one fourth, then one fifth of the total nitrogen in the mixture. Finally, the force of events and the careful experimental work at the North Carolina Agricultural Experiment Station, spearheaded by Dr. W. E. Colwell, cleared the

way for the recommendation of an all water-soluble, nitrogen tobacco fertilizer for the region.

The response of the tobacco crop to the use of fertilizer is influenced by the soil type, its state of fertility, type of tobacco, weather and soil management practices. Connecticut Valley soils favored for tobacco growing are sandy textured. This one factor, which favors leaching of nutrients in a period of heavy rainfall, was largely influential in the preference given to water insoluble nitrogen carriers. In 1958 the Connecticut Agricultural Experiment Station, in cooperation with selected tobacco farmers and the State Extension Service staff, conducted a series of field experiments to determine the merits of the cheaper synthetic nitrogenous fertilizers then used in tobacco fertilizer mixtures. Most growers of outdoor and shade tobacco in 1958 used these cheaper fertilizers on a trial basis. The results of the official tests and the experience of most growers last year led the Station authorities to issue Bulletin 623 (April, 1959) in which it is concluded that, at least under the conditions of 1958, oil seed meals are not necessary as a nitrogen source for the production of a tobacco crop of high yield and quality. Water soluble sources, such as ammonia, nitrate and urea when supplemented by side-dressings or by less soluble synthetics such as ureaforms were practically as effective in the production of a crop as were the meals.

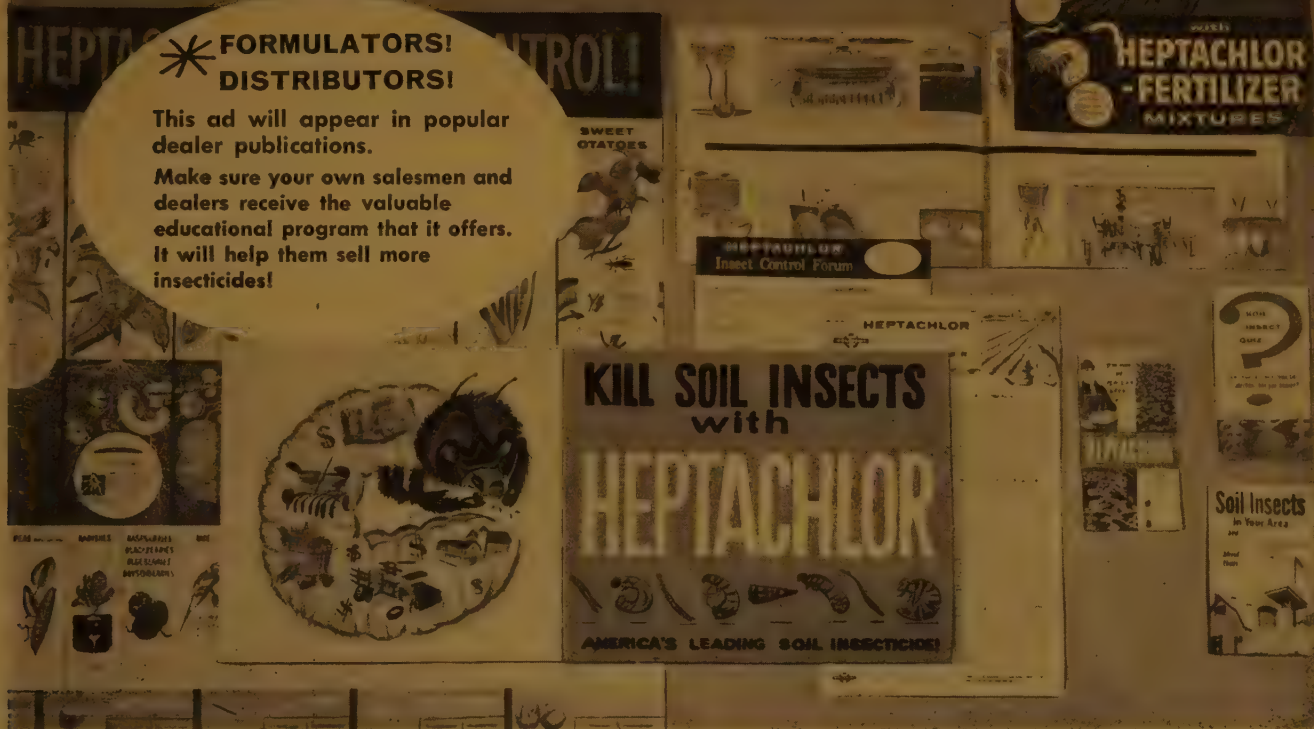
To the writer this statement is of particular satisfaction. For many
(Continued on Page 119)

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NEWS about the TRADE



Everett Succeeds Marshall

Loy A. Everett has been appointed sales manager of the Commercial Solvents Corp.'s agricultural chemicals sales department. He succeeds Clyde T. Marshall, who has resigned from the company.

For the past two years, Mr. Everett has been assistant sales manager of the department, with headquarters in New York. Prior to joining Commercial Solvents, he was associated with the Virginia-Carolina Chemical Corp., Richmond, Va.



Thompson-Hayward to Build

Plant, warehouse, and headquarters operations of the Thompson-Hayward Chemical Co., Kansas City, Mo., will be consolidated on a recently-acquired industrial tract in Wyandotte County, Kansas, under a five-year building program now underway.

The initial phase will include new offices, warehouse and one of six plants eventually to be moved to the new site. The first units are scheduled for completion in the fall of 1960.

Wisconsin Pesticide Conf.

The 14th annual Wisconsin Pesticide Conference with Industry will be held Jan. 6 and 7, 1960, at the Wisconsin Center Building, University of Wisconsin, Madison. Dr. E. H. Fisher, Department of Entomology, will be general chairman of the meeting.

CFA Meeting Nov. 8 to 11

A panel discussion on technical progress and business stability will be a feature of the 36th annual convention of the California Fertilizer Association, being held Nov.

8-11 at the Fairmont Hotel in San Francisco. R. L. Luckhardt, Collier Carbon and Chemical Corp., Los Angeles, will be moderator.

Members of the panel will be: Floyd Hornibrook, Best Fertilizers Co., Lathrop, Calif.; Dr. Guy F. MacLeod, Sunland Industries, Inc., Fresno; Dr. Malcolm H. McVickar, California Spray-Chemical Corp., Richmond; Larry M. Roberts, Shell Chemical Corp., San Francisco; James F. Sloan, J. F. Sloan Co., Salinas; and William E. Snyder, Wilbur-Ellis Co., Los Angeles.

Among other speakers will be R. Coleman of NPFI.

Joins Agrico Service Staff

William B. Tavener has joined the agronomic service division of The American Agricultural Chemical Co., New York, as turf and garden agronomist. His headquarters are in the New York office.

Evans Joins Pollard

Fred L. Evans has been appointed sales manager of the Pollard Manufacturing Co.'s Fertilizer Division, Minneapolis, Minn. He had been with the Dempster Mill Mfg. Co.

Stauffer, Victor To Merge

Shareholders of the Stauffer Chemical Co., New York, have approved a merger with the Victor Chemical Works, Chicago. Victor shareholders previously had approved the merger also.

Victor will be operated as the Victor Chemical Works Division of Stauffer. Under terms of the merger, each share of Victor stock will be exchanged for one share of Stauffer stock.

Nopco Sales Manager

Edward G. Weierich has been appointed sales manager of the insecticide department of the Nopco Chemical Co., Newark, N. J.

Van Winkle Joins Rohm & Haas

Dixon Van Winkle, formerly with Atlas Powder Company, Wilmington, has joined Rohm & Haas Co., Philadelphia, and will shortly leave the U. S. to take charge of an office for Rohm & Haas in Australia.

C&I and Girdler Merge

The Chemical & Industrial Corp., Cincinnati, and the Girdler Construction division of Chemetron will merge. C&I will be the parent company and Girdler Construction will be a subsidiary, according to a joint announcement by the two companies. For giving up the construction end of its business, Chemetron is said to be getting "a substantial minority interest" in C&I.

Judgment Favors Monsanto

Judgment was entered in United States District Court in St. Louis, Mo., last month in favor of the Monsanto Chemical Co. against the Continental Insurance Co., New York, in a suit resulting from an explosion April 16, 1957, at Monsanto's plant at Nitro, W. Va. Damage amounted to \$4,432,188.

Monsanto filed suit for a declaratory judgment to determine which of two insurance companies should assume liability. The two insurance carriers were Hartford Steam Boiler Inspection and Insurance Co., Hartford, Conn., and

Continental. Monsanto had insurance coverage with both insurers but each claimed the other was liable.

The main issue at the trial revolved around the circumstances of the explosion which occurred inside a 1000 gallon tank being used in the production of an insecticide. The decision depended on a determination of the conditions which prevailed at the time of the explosion. Eight persons were killed in the blast.

CACA Elects R. B. Marr

R. B. Marr, Naugatuck Chemicals, Montreal, was elected president of the Canadian Agricultural Chemicals Association at the group's annual meeting in Quebec, Sept. 20 to 24. Elected vice presidents were J. K. Brown, Green Cross Division, Sherwin Williams Co. Canada Ltd., Montreal; and J. G. Hastings, Chipman Chemicals Ltd., Hamilton. C. R. Burrows, Allied Chemical Canada Ltd., Montreal, was elected secretary.

Some 75 delegates attended the convention in which discussions centered about such topics as: agricultural extension; the Quebec market for pesticides; pesticide research in the Federal Department of Agriculture; the future of corporate farming; and maleic hydrazide and growing tobacco.

Ogden Named By Chase Bag

A. C. Ogden, sales manager of the Chase Bag Co.'s Kansas City branch since 1956, has been appointed special representative in the Kansas City area. He is succeeded as sales manager by H. R. Quimby.

Charles Hunt Joins Geigy

Dr. Charles R. Hunt has joined the research department of Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N.Y. He is a field representative in Montana, North and South Dakota, Wyoming, Minnesota, Iowa, Nebraska, Kansas, and Colorado.

To Manage Spencer Office

Charles L. Monson has been named to manage the new northwest district sales office of Spencer Chemical Co.'s agricultural chemicals division. The office is at Omaha, Nebraska.



Mr. Monson joined Spencer in 1948 and has served in a number of agricultural sales positions. Most recently, he was manager of national accounts. As manager of the northwest district, he supervises a sales area which includes Iowa, Nebraska, Montana, North and South Dakota, Minnesota and Wyoming.

Chemical Exposition Nov. 30

The 27th Exposition of Chemical Industries will be held in the New York Coliseum, Nov. 30 to Dec. 4. The exhibits at the show are expected to forecast the increasing employment of packaged facilities as aids to manufacturing economy.

Mills and pulverizers, for instance, will be shown in tandem arrangements with separators and

feeders. Also of interest to representatives of the agricultural chemicals industry should be such exhibits as the one showing the applications of five clays—attapul-gite, bauxite, kaolin, and limestone — for adsorption, catalysis, extending, suspension, and surface modification. Another will offer Cacadylic acid as a herbicide as well as Pyrollidine.

Among the companies already planning exhibits is the Young Machinery Sales Co., Muncy, Pa., who will show Transvair pneumatic conveying systems, mixing, and blending equipment.

AP&CC Research Head

Dr. Donald S. Arnold has been named manager of research at the American Potash & Chemical Corp.'s main plant at Trona, Calif. He succeeds Dr. Donald E. Garrett, who resigned from the company recently to enter his own business.

Carbide Opens Technical Center

THE Technical Center of the Union Carbide Chemicals Co. division of the Union Carbide Corp., at South Charleston, W. Va., was opened officially Oct. 21.

With the recent completion of the Engineering Building, there now are five major functions housed in the center: the Research, Development, and Engineering departments of Union Carbide Chemicals Co., the Engineering department of the Union Carbide Olefins Co., and the Design and Construction department.

Considered complete, the Technical Center now includes three major buildings for the Research, Development, and Engi-

neering departments; two high-pressure laboratories, with a total of 39 test cells; one chemical and two plastics/resins pilot plants; applications research laboratory; radiation laboratory; cafeteria; and supporting facilities.

The Engineering Building (shown here) is a four-story, four-wing structure with two-story outcroppings on each wing to serve as drafting room areas. Gross floor area of the building is 196,800 square feet. Its frame is steel, and the floor slabs and roof are reinforced concrete. Exterior walls are glass and insulated thin-wall panels, except for the end walls of the wings, which are buff-colored brick.



Soil Fertility Course

A soil fertility short course for fertilizer and lime salesmen was held Nov. 4 and 5 in the Duncan Hall Auditorium of the Alabama Polytechnic Institute, Auburn, Ala.

Howard T. Rogers, head of the department of agronomy and soils, was chairman. Among the subjects covered were: the importance of soil texture; soil acidity and liming; and minor element needs of Alabama soils. Three two-hour sessions were devoted to discussions of potassium, phosphorus and nitrogen.

Clupak Licensing Program

Clupak, Inc., New York, owners of the Clupak trademark for tear-resistant paper, has announced the details of its worldwide licensing program which already includes Swedish and Canadian paper companies, as well as nine American firms.

Under the program, the manufacture of Clupak paper is open to any paper company throughout the world at a fixed royalty fee. Clupak, Inc., will make available to every company under license its own technical know-how and, also will pass on to all licensees information on all advances made by any other company in the field.

Mayfield Urges P. R. Program

The desirability of having a public relations program to build public interest in entomology was emphasized by Paul Mayfield of Hercules Powder Co., in an address at the annual meeting of the Eastern Branch of the Entomological Society of America, held in Atlantic City, N. J., October 30. It should be highly important to all those concerned with pest control, Mr. Mayfield said, to build up in the minds of the public the worth and importance of the science of entomology. One natural goal, he suggested, would be to encourage more young men and women to enter the entomological profession. Other goals would be to build prestige for entomologists and the entomo-

logical profession, and to prepare the public to appreciate the importance of the entomologist's contribution to essential pest control programs.

IMC Sees Strong Year In '60

The International Minerals & Chemicals Corp., Skokie, Ill., anticipates a strong year," with earnings perhaps 15 per cent ahead of the fiscal year ended June 30, 1959, barring unforeseen developments, Thomas M. Ware president, told the firm's annual meeting Oct. 27.

He reported that first quarter net earnings amounted to \$537,000 against a loss of \$38,000 in the like period last year.

In a detailed report on the company's fertilizer business, Mr. Ware noted that at the current rate of increased use of nitrogen in the firm's products, the volume by 1964 would be sufficient to justify production of nitrogen "for our own use." A similar situation exists in sulfur, he said.

Raymond Bag Sales Shifts

R. G. Roberts Jr. has been appointed to the newly-created position of assistant sales manager by the Raymond Bag Corp., Middletown, Ohio. He had been connected with the company's Chicago sales office.

Others involved in Raymond's sales organization shifts were: T. H. Bacon, formerly eastern district sales manager, who has been named eastern regional sales manager, located in New York; R. J. Stevens, former Midwestern district manager, who now is western regional sales manager in the Chicago office; and J. M. Greene of Raymond's Louisville office, who has been appointed central district sales manager.



Fertilizer Solutions Meeting

The annual convention of the National Fertilizer Solutions Association will be held November 8-10 at the Statler Hilton Hotel, St. Louis, Mo. Industry conference rooms will be open on November 9th, with technical and production sessions held on November 10th.

Included in the program will be reports on Formulations, by H. H. Tucker, Sohio Chemical Co.; Corrosion, by M. V. McJunkin, United States Steel Co.; Nitrogen, J. E. Tuning, Spencer Chemical Co.; Phosphates, James L. Brown, Monsanto Chemical Co.; Potash, Edwin C. Kapusta, United States Potash Co. A panel discussion on solutions and suspensions, will include as participants: W. S. Newsum, Jr., International Minerals & Chemicals Corp., and Edgar W. Sawyer, Jr., Minerals & Chemicals Corp. of America.

Technical Publications Firm

Corporate Publications, Inc., a new firm in the technical writing field, has been formed as a division of W. Alec Jordan Associates, New York. The organization offers a complete writing and design service for the preparation of technical sales and related corporate material.

W. Alec Jordan is president of the new company. He also is head of the affiliated technical public relations firm. H. Earl Tremain has been named vice president. He formerly was with the Wyandotte Chemicals Corp. and the Colgate-Palmolive Co.

Monsanto Names Two

Joseph W. Tripp and Roger L. Weinheimer have been named to district sales position in the Monsanto Chemical Co.'s Inorganic Chemicals Division agricultural chemicals sales group.

Mr. Tripp, who had been a member of the sales group at St. Louis, Mo., has joined the Los Angeles district sales office. Mr. Weinheimer, a sales representative at Detroit, has been assigned to the Denver, Colo., office.

To Consolidate Sales

Sales of Du Pont agricultural and industrial products made by the company's Industrial and Biochemical Department have been consolidated under two new groups.

The Industrial Chemicals division is responsible for the sale of all industrial chemicals formerly handled by the Grasselli Chemicals and Polychemicals departments. The Biochemicals Division is responsible for all agricultural products formerly handled by these departments as well as sales of antifreezes.

Thomas H. McCormack, formerly director of sales for Grasselli products, is general director of sales for the Industrial and Biochemicals Department. The director of sales for the Industrial Chemicals Division is John H. Daughtridge. He had been sales director for the Chemical Products Division.

Chemagro Appoints Flavin

James P. Flavin has been appointed field research representative for the south central states by the Chemagro Corp., Kansas City, Mo. Mr. Flavin has been with Chemagro's product development section since 1955.

Heads Sunshine Plant Food

B. E. Adams has been elected president of the Sunshine Plant Food Co., Clovis, New Mexico. Mr. Adams joined Sunshine as executive vice president in June, 1958.

E. F. Williams, former president, has been named chairman of the board.

Du Pont Forms French Firm

E. I. du Pont de Nemours & Co., Wilmington, Del., has formed a French company, du Pont de Nemours (France) S.A., to contract for the manufacture of weed killers in the French market.

The new concern, a wholly-owned subsidiary of Du Pont, will sell Telvar and Karmex herbicides. Headquarters are in Paris.

Northwest Plant Food Group Names Karl Baur President

By Loren H. Milliman

MORE than 300 attended the 10th annual Pacific Northwest Plant Food Association meeting in Yakima, Wash., Oct. 14 to 16. They heard reports about the latest developments in the industry in all parts of the world and elected Karl Baur, Pacific Supply Cooperative, Portland, Ore., president.

Raoul Allstetter, NPFI, told how programs had been developed in various parts of the nation to bring to all interested groups the latest recommendations on fertilizer use as developed by researchers in industry and in the colleges and transmitted to the county agents and extension service. Similar activities gradually are developing in the Far East, he reported.

Bulk handling of fertilizer and new fertilizer equipment were discussed by speakers and displayed in a particularly fine assortment of machines for the benefit of those attending the convention. Because of the tremendous growth in the liquid fertilizer field, most emphasis, both by speakers and in the equipment demonstrations, was in this area.

Numerous panels dealt with various phases of developments in the equipment field and plant applications, insurance and liability problems, labels, and registration of them to comply with state regulations.

At the annual business meeting it was decided to increase the scholarships offered to outstanding soils students from \$100 to \$250. An award of that amount will be made to students in Washington State University, Pullman; Oregon State College, Corvallis, and the University of Idaho, Moscow.

Officers elected in addition to Mr. Baur included Harold Reed,

J. R. Simplot, vice president; and Henning Waltersdorph, Seattle, treasurer. Leon S. Jackson, Portland, will continue as executive secretary.

Among the speakers were Randy Keim, market development manager, Wilson & George Meyer, San Francisco; Bob Hale, John Deere Plow Company; Ralph Meeder, Meeder Equipment Company, Los Angeles, and Stewart Turner, San Francisco, consulting agrilogist.

The Yakima session was the second of two yearly meetings. During the summer meeting, college scientists report on their findings. In the autumn, industry men discuss their problems. Next summer's three-day meeting is planned for early July in Salt Lake City, Utah, while the autumn meeting probably will be held in mid-October in Idaho, according to Mr. Baur.

Ray Whitcomb, Grandview, Wash., retiring president, was in general charge of the program, assisted by Dick Smith, Mount Vernon, Wash., program chairman.

Grant Braun, Portland, is chairman of the soil improvement committee, generally regarded as the "wheelhorse" group. Dr. Robert Bertramson, head of the department of agriculture, Washington State University, is secretary of that committee which is composed of eight industry representatives, two each from each of the Pacific Northwest agricultural schools and colleges, and two members at large from the USDA ARS.

In addition to large representations from the three Pacific Northwest states, there were sizable delegations from British Columbia, Utah, California and Montana at the convention.

Arcadian News

Volume 4

For Manufacturers of Mixed Fertilizers

Number 11

Technical Tips for Better Ammoniation

THE RIGHT COMBINATION TO MEET FORMULA NEEDS

Whether you produce low-analysis or high-analysis fertilizers in pulverized, granular, or semi-granular form, you have many different ARCADIAN® Nitrogen Solutions from which to select those best suited to your ammoniation needs.

Making the most advantageous selection is not always a simple matter. It can be a perplexing problem to choose the right combination of solutions and other ingredients to produce the weights and plant food ratios that are desired,

and to control moisture and keep costs down.

This is true even in the production of fertilizer from which moisture is not to be removed. It becomes an even more complicated problem as the analyses are raised and when moisture is to be removed, as in granulation . . . or, held to a low level, as in semi-granulation.

The table below shows how such problems are solved, using three different NITRANA Solutions as examples. Many other combinations and complexes

are obtainable with these and other ARCADIAN Nitrogen Solutions.

The table shows how to get a specific ratio of nitrogen to phosphoric acid within definite weight limits. Three different NITRANA Solutions are shown combined with superphosphates and sulphuric and phosphoric acids. For efficient use of this table, you can find the pounds of neutralizing ammonia per unit of nitrogen in each Solution listed on the back page of this issue of The ARCADIAN News.

The formulation you need may demand the maximum of 20% superphosphate for its low cost P_2O_5 combined with its ability to react with much ammonia thereby also holding the cost of nitrogen to a low point in the formula. A considerable amount of phosphoric acid may be justified for its economy of weight in total plant food when reacted with nitrogen solutions.

The table shows that supplying one unit of P_2O_5 with 20% superphosphate

(Continued on following page)

MATERIALS COMBINED AMMONIATION RATES	BASED ON ONE UNIT	NITRANA 2				NITRANA 2M				NITRANA 3			
		TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %	TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %	TOTAL LBS. PRODUCT	% N	% P_2O_5	TOTAL %
Superphosphate 20% 6.0% H_2O 6.0 lbs. NH_3 /Unit P_2O_5 *WET TOTALS DRY TOTALS	P_2O_5	127.0 117.5	8.7 9.4	15.8 17.0	24.5 26.4	125.2 117.5	8.8 9.4	15.9 17.0	24.7 26.4	122.8 112.6	7.6 8.3	16.3 17.8	23.9 26.1
Triple Super. 47% 3.0% H_2O 3.0 lbs. NH_3 /Unit P_2O_5 *WET TOTALS DRY TOTALS	P_2O_5	56.1 53.1	9.9 10.4	35.6 37.7	45.5 48.1	55.2 53.1	10.0 10.4	36.2 37.7	46.2 48.1	54.0 50.6	8.7 9.2	37.0 39.5	45.7 48.7
Sulphuric Acid 66° Be 93.19% Acid 3.1 lbs. Acid/lb. NH_3 *WET TOTALS DRY TOTALS	N	82.2 73.6	24.3 27.2	0.0 0.0	24.3 27.2	78.9 73.6	25.3 27.2	0.0 0.0	25.3 27.2	88.5 76.9	22.6 26.0	0.0 0.0	22.6 26.0
Phosphoric Acid 75% Acid 54.3% P_2O_5 7.2 lbs. NH_3 /Unit P_2O_5 *WET TOTALS DRY TOTALS	P_2O_5	69.2 55.9	19.2 23.8	28.9 35.8	48.1 59.6	67.1 55.9	19.8 23.8	29.8 35.8	49.6 59.6	64.2 50.0	17.4 22.4	31.2 40.0	58.6 62.4

neutralized with 6 pounds of ammonia from NITRANA 2M adds about 117.5 pounds dry weight. The product should analyze about 9.4% N and 17% P₂O₅ and have a total of 26.4% plant food. Ratio of N to P₂O₅ would be about 1 to 1.81.

A great increase in plant food concentration results when one unit of P₂O₅ is supplied by 75% phosphoric acid (54.3% P₂O₅) and this acid is neutralized with 7.2 pounds of ammonia from NITRANA 3. Only about 50 pounds dry weight is involved and the product would analyze about 22.4% N, 40% P₂O₅ and 62.4% total plant food. Ratio of N to P₂O₅ would be about 1 to 1.79.

Further flexibility in economy, heats generated, concentration of plant foods, and influence on condition for desired effects are achieved in using triple superphosphate or sulphuric acid for neutralizing the ammonia.

Heat of ammoniation varies greatly

with different materials, as shown below. The proper amount of heat aids moisture removal and granulation. To raise one ton of fertilizer 1°F., requires 500 B.T.U.'s. Evaporation of one pound of water absorbs about 1040 B.T.U.'s, which would cool a ton of fertilizer about 2°F.

Heat Generated by Reacting Ammonia.

Material	B.T.U.'s of Heat per Pound of Ammonia
Superphosphate 20% P ₂ O ₅	1460
Triple Superphosphate	1540
Phosphoric Acid	1900
Sulphuric Acid	2940

Nitrogen Division Technical Service is always ready to help you with specific ammoniation and formulation problems. Write Technical Service, Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

PRECAUTIONS FOR HANDLING NITROGEN SOLUTIONS

Accidents that occur during the handling of nitrogen solutions are usually the result of taking short cuts in procedure, carelessness, or lack of knowledge of certain characteristics of nitrogen solutions. Specifically, there are *four areas* where plant management should concern itself with the establishment and strict enforcement of safe practices.

No. 1—Personal Safety Equipment

Most nitrogen solution plants provide their operators with protective equipment, but, unfortunately, do not make sure that it is used. Regular inspections of safety equipment and its use should be instituted, and the employee should be made responsible for the condition of this equipment.

Nitrogen solutions do not have the strong caustic properties of some of the other materials handled in fertilizer plants, such as sulphuric acid or anhydrous ammonia. However, an operator should be provided with a good set of goggles or a full-face mask if he works in an area where gauge or rotometer glasses might break, or a line might rupture.

Connecting and disconnecting tank cars is a job that demands adequate personal safety equipment. Here, the men are working in a rather limited space, high above the ground, with limited opportunity for emergency exit. Obviously, proper safety equipment should be provided for two reasons: first, of course, as protection against contact with the

solution; second, to prevent panic which may result in a fall causing injuries more serious than those brought about by contact with the solution. This equipment includes: full-face gas masks with speaking diaphragms, gauntlet-type chemical-resistant gloves, and a chemical-resistant apron. A long sleeve cotton shirt is recommended to cut down exposed skin area.

Gas-mask canisters should be replaced periodically, even though they may not have been used in an ammonia atmosphere. These canisters carry a date which should be respected. Even an experienced man could panic if he found that the gas mask he trusted had suddenly filled up with ammonia gas.

Plant managers would do well to insist that connection and disconnection of tank cars be handled by two men—one to do the job and the other to stand by to give aid in an emergency. For example, when connecting a tank car, the safety man should be stationed on the ground with a fire hose. In the event of a broken connection, he would be able to direct a stream of water on it immediately, to minimize the danger.

Needless to say, steps should be taken to see that tank cars are not disturbed once hose connections have been made. Place a "tank-car-connected" sign and a derail device ahead of the car. Make sure car brakes are set. When the car is not actually being unloaded, don't allow hoses to remain connected or valves on the car to remain open. If unloading

takes place at night, make certain that the area around the car is well lighted, so that switching crews can see that the tank car is connected.

After unloading, make sure that the tank car is completely disconnected and ready to go before telling the switch crew to pull it out. It's no easy matter to close valves on a tank car while a hose under 40 to 50 lbs. pressure is whipping about, spraying solution.

No. 2—Safety in Production Equipment

Failure of plant equipment is another source of danger. The entire solution system should be constructed of the best materials available. It pays to follow the solution supplier's recommendations to the letter—and then assume a real possibility of failure. With this attitude, a plant's preventive maintenance program becomes an accident prevention program as well.

Care should be exercised when choosing equipment. For example, carbon steel is often used for solutions handling systems. This is not good practice. There are other materials, readily available, that are much more satisfactory. These include: aluminum and most aluminum alloys, including 5052, 5154, and 6061; stainless steels including Types 304, and 316; and rubber, Neoprene, polyethylene, vinyl resins and glass. Among the materials destroyed rapidly, and to be avoided under *all* circumstances are: copper, brass, bronze, Monel, zinc, galvanized metals, conventional die castings, concrete, and most alloys that contain any of the above materials.

When nitrogen solutions evaporate, they leave a salt residue. It is important, therefore, to pick valves, such as pressure relief valves, that will operate even though they contain salt deposit. Indeed, pressure relief valves should be operated periodically, to make sure they are functioning.

It is important to consider the materials from which valves and fittings are made. For example, aluminum will not stand the physical abuse that carbon steel and stainless steel can. So, in aluminum installations, it is best to locate stainless steel valves at critical points, such as on storage tanks. Wherever a line will be connected and disconnected quite often, stainless steel threaded connections should be used.

Where there are diaphragm type valves, inspect and replace diaphragms regularly. This helps avoid the hazard of replacing a ruptured diaphragm while the system is full of solution and under pressure. Unloading hoses should have bleed valves, or the system designed so that the operator can safely bleed off pressure before disconnecting.

It never pays to skimp on hose—for



Ask Nitrogen Division for Technical Help

To provide customers with competent, well-qualified technical assistance, Nitrogen Division, Allied Chemical Corporation, maintains the largest, best-trained, most-experienced staff of fertilizer technologists in the industry. These men are ready, willing and able to help you find the practical answer to your formulation, ammoniation and manufacturing problems. They are skilled in ferreting out trouble spots and in helping you to correct operating techniques. Their services are available to customers without charge. Call Nitrogen Division, 40 Rector Street, New York 6, N. Y. HANover 2-7300.

Hoses undergo rough handling, deterioration and high pressures. Where a plant is using high pressure nitrogen solutions, it would be well to consider anhydrous ammonia hose. However, regardless of the type used—and in the absence of hydrostatic testing—all hoses should be replaced periodically, for it is difficult to see a weak place or break with normal inspection.

No. 3—Safety in Repairs and Salvage

The area of repair and salvage has even greater potential hazard than exists in routine production procedures. For example, a very dangerous repair practice is the use of a welding or cutting torch on equipment, particularly steel, that has been in nitrogen solution service.

In an actual case, an operator attempted to make a repair weld on the outside of a steel storage tank that had a leak in its upper portion. Shortly after he started, the tank began to heat up further away from the weld area than would normally be expected. Then the pressure relief valve opened, allowing dense fumes to escape. The local fire department was called. By the time they arrived and put a stream of water on the tank, it had gotten *red hot* above the solution level. Whether it was due to the cooling effect of the water or the

material in the tank burning itself out, the heat gradually subsided, and no explosion occurred.

Now here is what caused this dangerous situation. As solution was used and the level in the tank dropped, solution clinging to the sides of the vessel evaporated, causing ammonium nitrate to be deposited. As fertilizer producers know, sufficient heat will cause ammonium nitrate to decompose in a self-sustaining reaction. Decomposition itself is a relatively slow reaction but the fumes evolved can soon build up tremendous pressure, particularly if confined in a limited space. Since ammonium nitrate does have a self-sustaining decomposition and a separate oxygen supply is not required, it is impossible to smother this type reaction. The only way to stop it is to cool the ammonium nitrate adjacent to the decomposing ammonium nitrate to a point where the heat supplied will not be sufficient to raise the unreacting ammonium nitrate to its decomposition point.

Another case involved an abandoned steel pipe that had been in solution service. All of the pipe had been taken down, with the exception of a 25-foot length hanging along an unloading platform. An air line ran just below this pipe. Years later, in the winter, the air line froze. Attempting to thaw it, a laborer ignited a bucket of waste and set it under the air line. Unfortunately the aban-

doned solution line ran right through the flame. Shortly thereafter, a terrific explosion occurred. Part of the unloading platform was torn out and flying steel severed a hose lying 150 feet away. Luckily, no one was in the area at the time.

Several safe operating practices should be apparent from the foregoing. First of all, *never* apply heat to thaw or repair any equipment used for handling nitrogen solutions if it can possibly be avoided. Occasionally a steel tank may spring a leak which may be fixed by welding. However, if a steel tank has corroded that much in one spot, the chances are that it would be unsuitable for use even after patching. If it is necessary to weld a tank—and even aluminum tanks sometimes need welding—the tank should be completely emptied of all materials and thoroughly washed with water until free from ammonia fumes. When it is safe for a man to enter the tank, have him use wire brush, chipping hammer and water to clean a large area where the weld is to be made. If, during the welding, any indication is given of the possible decomposition of ammonium nitrate, flood the entire area with water immediately to cool it down. Always keep men outside the tank to assist the welder. Have a harness around the welder's waist so that he can be pulled out if necessary. Have extra help nearby to remove the man quickly.

Under no circumstances should open flames or other sources of high localized heats be used to thaw nitrogen solution pipe lines. Use hot water. As for welding pipe, it's difficult to think of a situation where the cost saved by repairing a bad pipe line can be justified by the risk involved.

New fertilizer manufacturing techniques have brought about an increased use of sulphuric acid in the fertilizer mixer. Occasionally, because of the convenience of such an arrangement, equipment will be installed with the sulphuric acid and nitrogen solution systems connected. This can be an unsafe practice. Some situations may appear to be harmless, but there are many possibilities for dangerous arrangements: viz. connecting the vent pipes of acid and solution tanks together to economize on safety valves and piping.

When laying out systems such as these where a potential hazard may exist, you cannot be too careful. For example, even batch tanks, with their exposed gauge glasses, are a source of potential danger. Protect gauge glasses with shatter-proof glass or plastic guards. It's wisest to use integrating type meters of stainless steel. These are entirely suitable for batch type operations, and are available today at relatively low cost.

Another design defect is the absence of pressure relief valves in anhydrous

(Continued on following page)

(Continued from preceding page)

ammonia pipe lines. Because the coefficient of expansion of liquid ammonia is so high, it is essential to locate a pressure relief valve at any place in an anhydrous ammonia system where there is a possibility of trapping liquid ammonia between two closed valves.

No. 4—On-the-Spot Emergency Aid

Plant management should see to it that emergency showers are installed in

operating areas. Make sure that this equipment is usable throughout the year and does not have to be turned off during freezing weather. Men working in close proximity to nitrogen solutions, anhydrous ammonia and acids have the right to expect emergency aid near at hand if the need arises. See that they have it!

To sum up the case for safety—nearly all the liquid materials used in fertilizer

manufacturing operations can be hazardous materials. So, look over your plant layout. Make modifications to minimize or avoid these hazards. Install safety equipment. Instruct your operators on how to handle these materials properly. Give them the necessary protective equipment . . . and insist that they use it. Then assume that there will be accidents and provide emergency treatment facilities in the area, so that aid can be administered promptly.



NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. in. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

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MARKET REPORT

Potash Prices Advanced

Prices for imported potash (agricultural grades) were advanced 2 cents per unit K_2O , Oct. 16. This established the schedule at 54½¢ per unit for 60 per cent potash muriate, and at 86¢ per unit K_2O for potash sulfate. The next scheduled price increase is set for Jan. 15, 1960, at which time listings will go to 57¢ and 88¢ per unit, respectively.

Although East Germany no longer is competing in the U. S. potash market, no drop in imports is expected, because French, West German, and Spanish material is expected to fill the void. It is understood that East Germany abandoned the U. S. market because of low prices resulting from buyer resistance.

Ammonium Sulfate Shortage

The steel strike in the United States has resulted in a tight supply of ammonium sulfate. Producers of synthetic ammonium sulfate reportedly are "sold up" for the next six months. One leading maker reports that it already has committed its scheduled production for the next eight months. The prolonged steel strike resulted in the non-availability of byproduct sulfate, which in normal times supplies about half of the overall market.

The shortage of ammonium sulfate in the U. S. probably will cause imports of the chemical to rise sharply in coming months.

Two price changes took place Nov. 1. A \$1 per ton increase for ammonium nitrate brought the listing to \$66 per ton and the price of calcium phosphate dibasic was raised \$2.75 to \$3.15 per ton (depending upon phosphorous content).

DDT Price Firm

The price schedule for DDT, which was advanced 1¢ a pound October 1, is firm at 23¢ a pound for flake material in bags, and at 24¢ a pound for powder. The

General Services Administration is expected to place orders for from 45 to 60 million pounds of wettable powder this fall. The overall demand for DDT has been excellent throughout the past several months, reportedly due to heavy domestic buying as well as steady shipments to government and UN health agencies.

Sales Gain in 1959

Third quarter sales of the Spencer Chemical Co. have shown substantial improvement over the corresponding period of a year ago. Net sales for the quarter were \$14,265,102, compared with \$11,961,025 in 1958. Net income amounted to \$1,338,627, compared with \$720,008 in 1958. For the 12-month period ended Sept. 30, net earnings were \$5,783,450, up \$1,860,718 from the previous year.

The American Cyanamid Co.'s net earnings for the nine months ended Sept. 30 were \$40,028,000, 43 per cent above the \$27,915,000 earned in 1958. Sales reached a record high level of \$442,007,000 in the first nine months, 14 per cent above the 1958 figure.

Another company registering gains over 1958 was the Smith-Douglass Co. whose 1959 sales amounted to \$45,926,007, compared with \$39,887,737 in 1958.

New Stepan Emulsifiers

The Stepan Chemical Co., Chicago, has announced the development of two emulsifiers that reportedly will emulsify all of the pesticide types, such as herbicides and chlorinated and phosphorus insecticides.

Called Toximul R and Toximul S, the emulsifiers are said to produce better results than have been achieved with the specific emulsifiers used heretofore. Accelerated storage tests have indicated that Toximul R and Toximul S are stable even in reactive systems.

Another emulsifier development announced by Stepan is Toximul LF, a universal emulsifier for soil insecticides and other toxicants in most liquid fertilizers.

FERTILIZER ANALYSIS

(From Page 60)

quick and rapid analysis, consists of a fairly rapid urease hydrolysis of the urea, followed by direct titration of the ammonium carbonate formed. The ammonia due to the urea, and any ammonia originally present, is distilled into saturated boric acid solution. The ammonia found by subsequent titration is corrected for the ammonia from urea. Last, the sample solution remaining is diluted, treated with Devarda's alloy, and again distilled into boric acid solution for titration and estimation of nitrate content.

The method is applicable to urea-water solutions and urea-ammonia-ammonium nitrate water solutions. With a suitable sampling technique, which has also been tested, solutions with widely varying concentration ranges may be analyzed successfully with a precision and accuracy comparable to other methods.★★

Marketing Seminar

A marketing seminar for the agricultural chemicals industry has been announced for November 16-17 at the Barbizon Plaza Hotel, New York, by *Farm Chemicals*, a Philadelphia trade magazine.

Participating in the program will be Phillip Alampi, N. J. Dept. of Agriculture and C. E. St. Thomas of St. Thomas Associates, who will report on "The Modern Marketing Concept and Four Steps to Acceptance of It." A second panel will include M. H. Parseghian, National Analysts, Inc.; L. Hanower, Nitrogen Div., Allied Chemical Corp.; and J. R. Sargent, Cresap, McCormick & Paget. A third panel will include, L. S. Kaniecki, Tennessee Corp., who will comment on "Responsibilities of the Sales Manager;" V. H. Van Diver, Sr., to discuss "The Part Advertising Plays in Sales Growth," and an unannounced speaker to discuss, "How to be a Constructive Critic of Your Marketing Program."



PRODUCTS AND SERVICES FROM IMC

- Phosphate Rock
- Triple Superphosphate (Coarse, Granular, Run-of-pile)
- Phosphoric Acid
- Muriate of Potash (Coarse, Standard, Granular)
- Sulphate of Potash
- Sul-Po-Mag

Manufacturing and Technical Service
 Transportation Service
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 Management Services
 Marketing Services



He represents you in legislative discussions. He carries your case to legal bodies, works for better rates and regulations.



From mine to plant to customer . . . transportation charges are a major part of fertilizer costs.

Your IMC

TRANSPORTATION MAN WITH A MISSION

is trained, equipped . . . dedicated to solving *all* of your transportation problems, and *saving you money!*

Your IMC transportation service man knows what shipping delays can do to your sales during rush seasons . . . he knows the inconvenience you go through in waiting for settlement of damage claims . . . he knows that a change in routing can mean lost days and lost sales dollars.

IMC's transportation group handles millions of tons of fertilizer material every year. Much of our transportation law experience was gained before the I.C.C. We can back you up in your dealings with railroads, commissions and legislative bodies with the prestige we've gained as a large volume shipper.

Only International can give you thorough

transportation service of this extensive scope.

International pioneered a barge system to speed shipments up the nation's inland waterways. We maintain rolling warehouses — loaded boxcars — ready to move to you at a moment's notice. "On-site" warehouses, located in major trade areas, help you meet peak load needs promptly without high-cost rush shipment from distant points.

Your IMC transportation service man is interested in your whole transportation problem . . . getting materials to your plant . . . out to your customers . . . on time and at low cost. He has a mission of total service. He awaits your call.

Products for growth*



50
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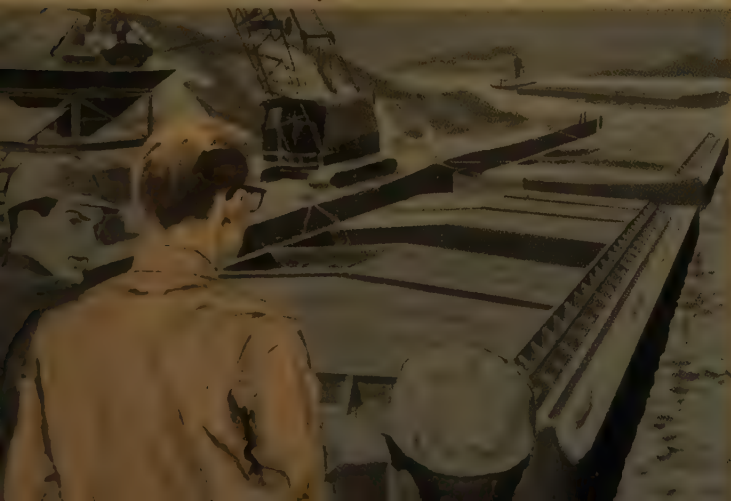
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INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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He determines best routes for shipping. His knowledge of loading and transportation techniques gives low-cost, on-time delivery.



He helps you solve shipping problems from your own plant. His knowledge of and prestige with carriers gets quick results.



HELP YOURSELF TO BIGGER PROFITS

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No other process begins to compare with *way-ahead* Sackett SUPER FLO in making normal, fortified and triple superphosphates of premium quality at *way lower* cost.

MIXED GOODS MANUFACTURE

Your investment in the latest Sackett Methods of producing conventional fertilizers is *guaranteed* to pay handsome returns. We are anxious to prove it.

GRANULAR FERTILIZER

Sackett Equipment leads the field in Granular Production.

The names of the fertilizer companies who have selected Sackett Granulating Processes above all others, read like a "Who's Who in Industry".

MODERNIZATION PROGRAMS

Step ahead of competition by entrusting your fertilizer expansion and modernization facility programs to our care. Many of the most forward-thinking fertilizer producers are glad they did.

NEW PLANTS

Invest your dollars wisely having Sackett build your plant. We do the whole job from the inception stage building construction equipment fabrication to operating plant. See us for guaranteed results.

There is nothing that appeals to a man's reason more than plain facts. And, one plain fact is this . . . you can help yourself to bigger profits by resolving **now** to replace wasteful obsolete plant equipment with the latest rock-bottom cost methods as exemplified in Sackett Production Processes and Materials Handling Equipment. Why not start the ball rolling by writing or phoning us today?



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Architects and **Manufacturing** Engineers to the Fertilizer Industry Since 1897.

America's Foremost **Creative** Designers & Builders of Commercial
Fertilizer and Superphosphate Plants . . . Related Production Equipment

Face Fly Spreads in U. S.

The face fly, known only in three states before 1959, has spread to 12 other states and has become an annoying pest of livestock in at least three of these states, the U. S. Department of Agriculture reported last month.

The pest, *Musca autumnalis*, was found in northeastern and north central states this past summer. It was reported most troublesome and abundant in Ohio, Indiana, and Illinois. Other states in which the fly was found are Wisconsin, Michigan, Delaware, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Vermont, and West Virginia.

Some Ohio farmers reported a marked decrease in milk production and said that the face fly was the most abundant species of fly noted during midsummer.

AOAC Elects Smith

Professor John B. Smith was elected president of the Association of Official Agricultural Chemists for 1960 at the group's annual meeting in Washington, D. C., Oct. 12 to 14. He succeeds Dr. A. H. Robertson of the USDA, who became a member of the executive committee.

Elected vice president was Dr. C. O. Willits of the Eastern Regional Research Laboratory, USDA, while Dr. William Horwitz of the Food and Drug Administration was re-elected secretary-treasurer.

Dr. Smith is head of the University of Rhode Island's agricultural chemistry department.

Spencer Award To Folkers

Dr. Karl A. Folkers, executive director of fundamental research of Merck, Sharp & Dohme Research Laboratories, Rahway, N. J., has been named winner of the 1959 Charles F. Spencer Award. The award is jointly sponsored by the Kansas City section of the American Chemical Society and the Spencer Chemical Co., Kansas City.

Dr. Folkers was selected for his pioneering studies in the chemistry

of vitamins. The award is being presented officially at the annual Fall Conference in Kansas City, Nov. 6.

Elected Vulcan Vice President

Mrs. Ruth Janet Zuck has been elected vice president of the Vulcan Steel Container Co., Birmingham, Alabama. Mrs. Zuck has been director of personnel since 1954 and will continue in that capacity with additional duties in sales and production administration.



Merck Names Roth

Warren D. Roth has been named a southwestern general products sales representative for the chemical division of Merck & Co., Rahway, N. J. His territory includes Southern California, Arizona, New Mexico, and western Texas.

Previously, Mr. Roth served as a field sales representative in Idaho, Washington, and Oregon and as a sales service supervisor in Merck's Pacific Coast Branch in Los Angeles.

Named V-C Agronomist

Paul Blizzard has been named to the home office staff of the Virginia-Carolina Chemical Corp. at Richmond, Va., as an agronomist. He had been a V-C fertilizer salesman out of Greensboro, N. C.

Named Research Specialist

Otis W. Allen has been appointed research specialist in the Research, Engineering, and Development Division of International Minerals & Chemical Corp., Skokie, Ill. His offices are in the company's Florida Experiment Station in Mulberry, Fla. Mr. Allen has been with IMC for 29 years.

Meyer Firm In New Offices

The Salt Lake City office of Wilson & Geo. Meyer Co. Inter-mountain has moved to a new location at 573 East Broadway in that city. The new offices are larger than those at the previous location.

C-VPFA Lists Speakers

Among the speakers at the meeting of the Carolinas-Virginia Pesticide Formulators Association, being held Nov. 30 to Dec. 2 at the Carolina Hotel in Pinehurst, N. C., will be L. Y. Ballentine, North Carolina Commissioner of Agriculture, and H. C. Edwards, executive vice president, N. C. Farm Bureau. Mr. Ballentine will cover significant agricultural trends in the Southeast and Mr. Edwards is to talk on some of the problems facing the southern farmer.

Other speakers will cover "Soil and Grain Insecticides", "New Developments in Weed Control on Cropped Land", "MH-30 Tobacco Sucker Control", "Marketing Plans and Policies", and "Recent Developments in Insecticides."

Diamond Aid to Education

The Diamond Alkali Foundation has established a four-fold program designed to financially assist higher education in the United States. The program, which becomes effective Jan. 1, 1960, includes direct financial grants to colleges, merit scholarship awards, graduate fellowships, and for the first time, an employee gift matching plan.

New Plant Superintendent

J. E. Bradley has been appointed production superintendent for the Monsanto Chemical Co.'s ultra-pure silicon plant now under construction at St. Charles County, Mo. He had been general operating supervisor at Mound Laboratory, Miamisburg, Ohio, which Monsanto operates for the Atomic Energy Commission.

Rutgers Pesticide Conf.

Rutgers University's annual conference for pesticide dealers is scheduled for Nov. 24 in Blake Hall, College of Agriculture, New Brunswick, N. J.

As in past years, the meeting will feature a discussion of herbicides, fungicides, and insecticides recommended for next season and a review of results this year.

Fertilizers won't cake—flow freely in the field

Many a farmer has been cursed by the serious caking problem which so often occurs when deliquescent fertilizers are stored in damp or humid conditions. And many a formulator has learned that this can easily be prevented by using Celite*. These tiny particles of diatomite surround the fertilizer crystals or prills with

a protective coating that can prevent contact between them and thus minimize caking.

At the same time Celite fillers improve flowability. The particles are not only microscopic in size but extremely irregular in shape. Thus Celite coated fertilizers flow more freely. As little as 2% of Celite assures more uniform

application in the field.

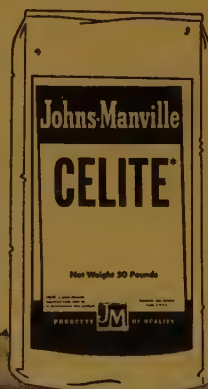
A Celite engineer will gladly help you put the right grade to work in your fertilizer. Just phone him at your nearest Johns-Manville sales office or write Johns-Manville, Box 14, New York 16, New York. In Canada, address 565 Lakeshore Road East, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

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CELITE

diatomite fillers



Johns-Manville CELITE

INDUSTRY'S MOST VERSATILE
MINERAL FILLER

AGRICULTURAL CHEMICALS

McConnon & Co. Is Sold

The majority interest in McConnon & Co., Winona, Minn., has been sold to five Winona businessmen who have served as the corporation's board of directors since a reorganization of the firm's management in 1956.

The five are: B. A. Miller, president of Miller Waste Mills; E. H. Finkelnburg, chairman of the Mississippi Valley Public Service Co.; J. H. Baker, president of Baker Shoe Co.; F. O. Gorman, president of the Gorman Co.; and George E. Kelley, executive vice president of the Bay State Milling Co.

Richard G. Vickery, former president of Knight & Bostwick, Newark, N. Y., has been named vice president-general manager of McConnon & Co., manufacturers of insecticides.

USDA Names Clarkson

Dr. M. R. Clarkson has been named associate administrator of the U. S. Department of Agriculture's Agricultural Research Service. As associate administrator, a new position in ARS, Dr. Clarkson will work with Dr. Byron T. Shaw, administrator of ARS.

Dr. William L. Popham, who had been serving as assistant administrator for regulatory programs, has been named to Dr. Clarkson's former position as deputy administrator of ARS.

Dr. Clarkson joined the USDA in 1930.

Michigan Sales Director

The Michigan Chemical Corp., Saint Louis, Mich., has appointed George L. Innes as director of sales and development. He had been manager of the chemical sales and development division of the Climax-Molybdenum Co., New York.

New West Virginia Office

The West Virginia Pulp and Paper Co.'s Multiwall Division has opened a new sales office in Charlottesville, Va., to be known as the Middle Atlantic Sales District. The district is comprised of Maryland,

Virginia, North Carolina, and South Carolina.

H. Lockwood Frizzell, formerly a sales representative for the division, has been named manager of the new sales district.

Named By Belgian Firm

H. J. Baker & Bro., New York, has been appointed exclusive U. S. agent for the urea production of Comptoir Belge de l'Azote, Brussels, Belgium. The Belgian firm, also known as Cobelaz, is one of Europe's largest producers of nitrogen.

Southern Weed Meeting

The use of selective herbicides for weed control in specific crops will be among the topics to be covered at the 13th annual Southern Weed Conference at the Buena Vista Hotel in Biloxi, Miss., Jan. 20 to 22, 1960.

Other topics to be explored at the meeting include: fundamental aspects of weed control; horticultural weed control; aquatic weed control; extension aspects of weed control; public health aspects of weed control; and new developments. Dr. Donald Davis of the Alabama Polytechnic Institute, Auburn, is chairman of the program committee.

New Products, Services Featured At Hardware Show

Among the exhibitors at the National Hardware Show in the New York Coliseum, Sept. 28 to Oct. 2, were: (top right) O. E. Linck Co., Clifton, N. J., whose exhibit featured the Linck lawn sprayer; the Velsicol Corp., Chicago, (below) who displayed samples of the gifts that are available to Chlordane dealers; and E. I. du Pont de Nemours & Co., Wilmington, Del., (below right) who introduced the Du Pont sprayer with three snap-in nozzles calibrated to deliver three spray rates.



Yugoslavia Plans 5 Plants

The government of Yugoslavia is reported to be contemplating the construction of five chemical fertilizer plants. The country's yearly requirements of fertilizers are estimated at about 1,300,000 tons and the capacity of existing factories is expected to reach 750,000 tons in 1961.

The largest of the contemplated plants is at Pancevo and is in an advanced stage of construction. Construction has not started on the remaining four plants, although some contracts already have been placed. Montecatini and Ansaldo of Italy and Rudnap of Yugoslavia will build a plant at Lucavac. Other plant sites are Sisak, Prahovo, and Kossovska Mitrovica.

Cyanamid Names Kennedy

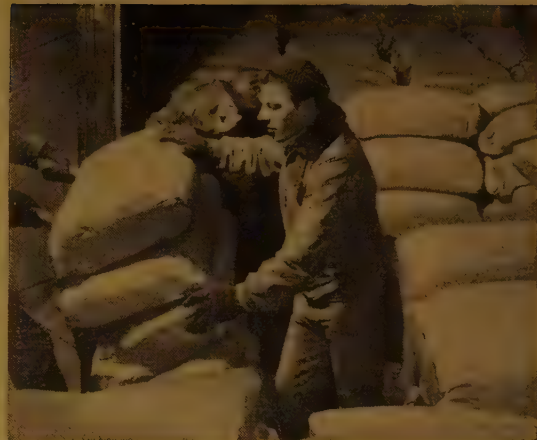
C. R. Kennedy, formerly northeast regional manager of the American Cyanamid Co.'s agricultural division, has been named assistant manager of the company's phosphates and nitrogen department.

Named to replace Mr. Kennedy as regional manager was H. H. Phillips, who had been assistant western regional manager with headquarters in Los Angeles.





TWENTY-TON LOAD aboard trailer fails to bother multiwall sack made with CLUPAK kraft. Patented, built-in stretch absorbs shock as wheels pass completely over. Sack contains 100 pounds of abrasive sand-blasting grit, found difficult to package prior to use of CLUPAK paper multiwalls.



SAVINGS PILE UP when CLUPAK paper multiwalls are used. Flexibility lets them fill better, may cut storage or shipping space up to 25%. Sacks can be palletized higher, easier, because they stack better.



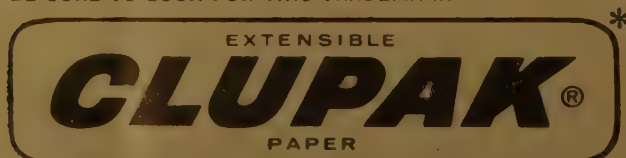
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Hudson Pulp and Paper Corp.
International Paper Co.
St. Lawrence Corp., Ltd. (Canada)
St. Regis Paper Co.
Union Bag-Camp Paper Corp.
West Virginia Pulp and Paper Co.

Indian Expansion Plans

In line with announced expansion plans for the chemical industry of India, the production of insecticides, fungicides, and herbicides is to be substantially expanded by several companies.

Alembic Chemical Works Co., Ltd. at Baroda, and Baharat Pulverising Mills Private Ltd. at Byculla, Bombay, and at Sayani Road, Bombay, have announced expanded production of B.H.C., Chlor-dane, Lindane, Endrin, Parathion, copper fungicides, and Warfarin.

Silvex Controls Bedstraw

Bedstraw, a weed threatening birdsfoot trefoil pastures in the northeastern states, is being controlled experimentally by the use of Silvex, a new herbicide, according to a U. S. Department of Agriculture report.

The weed was controlled in test plots of birdsfoot trefoil by one overall spray of silvex—2- (2,4,5-trichlorophenoxy) propionic acid — followed by spot treatment of surviving plants. Although the first harvest of birdsfoot trefoil was reduced by the herbicide, normal yields were obtained in subsequent cuttings.

Monsanto Building Center

Construction has been started on the Monsanto Chemical Co.'s new research center in St. Louis, Mo. In the first phase of a long-range program, buildings comprising more than 400,000 square feet of total area will provide facilities for about 800 scientific personnel. Monsanto plans to transfer about half of this number to the St. Louis area from other research locations.

Five Join Spencer Staff

The Spencer Chemical Co., Kansas City, Mo., has announced the addition of five men to the sales and technical staff of its agricultural chemicals division.

The five are: Richard R. Redle, Michigan sales representative; Donald C. Mitchell, Oklahoma sales representative; Julian F. Holloway, Arkansas sales repre-

sentative; Edward J. Hallacy, technical service representative in the southwest district; and Hubert L. Balay, technical service representative in the northwest district.

FFVA Research Award Winner



Dr. Gaylord M. Volk, soil chemist with the Florida Agricultural Experiment Station, Gainesville, Fla., was the winner of the annual Research Award given by the Florida Fruit & Vegetable Association.

The award was presented for Dr. Volk's work in the discovery and remedy for nutritional leaf roll in potatoes, tomatoes, tobacco, peppers, and eggplant. Dr. Volk received the plaque emblematic of the award at association's 16th annual convention in Miami Beach, Sept. 23 to 25.

Malathion For Dairy Cattle

Malathion has been accepted by the U. S. Department of Agriculture for the control of horn flies on dairy cattle. The approved claim states that malathion can be used for the control of horn flies on dairy and beef cattle and that the dust can be applied directly to the backs and necks of the animals.

Applications are recommended at 10 to 14 day intervals using two ounces of 4 per cent dust or three tablespoons of 5 per cent dust.

Du Pont Names Miner

George E. Miner has been named to the newly-created position of West Coast representative for garden products by E. I. du Pont de Nemours & Co., Wilmington, Del. Mr. Miner's headquarters are in Los Angeles.

Year-Around Technorama

Michigan State University, East Lansing, Mich., has announced plans to bring under one roof one of the largest and most com-

plete permanent displays of equipment, materials, ideas, and processes relating to the production of food and fiber and to family living ever attempted in the U. S.

In conjunction with this, a building of approximately 108,000 square feet is to be constructed that will have a "great hall" with a ceiling height of 20 feet, to accommodate large equipment. Adjoining the great hall will be "satellite areas", each of which would be developed around an interest idea, such as food technology, soil and water conservation, and the processing of agricultural products. Several meeting rooms and storage rooms also will be included, as will facilities for a food service. Second story floor space will be for light weight equipment, meeting rooms, and offices.

It is expected that the Technorama building will be in operation sometime next year.

Link Is Agrico Agronomist

James G. Link, Jr. has been named a southern regional agronomist for the American Agricultural Chemical Co., New York. He is located at Montgomery, Ala.

Spencer Wild Oat Herbicide

The Spencer Chemical Co., Kansas City, Mo., has announced the development of a selective herbicide to control wild oats. Trade-named Carbyne, the product is said to have shown definite control of wild oats in a number of crops grown in the north-central states and prairie provinces of Canada. Spencer currently is seeking registration of the herbicide and plans to market it on a controlled basis next spring.

A post-emergence herbicide, Carbyne in solution is applied as a spray when the wild oat plant is in the 1¼ to 2¼ leaf stage (about 6 to 9 days after emergence). Generally, experiments indicate, ½ lb. per acre is a satisfactory rate.

Spencer recently concluded a field testing program on Carbyne at five test locations, two in North

(Continued on Page 96)

Dakota and three in Canada. The product was tested on more than 8,000 test plots on wheat, flax, and barley. In general, the overall tests results indicate that Carbyne, if applied at the proper time and in the proper amount, can be effective in controlling wild oats. The chemical name of the new herbicide is 4-chloro-2-butynyl N-(3-chlorophenyl) carbamate.

Fisons Pest Control Ltd., Essex, England, has been granted an exclusive license to distribute and develop Carbyne in Western Europe and Scandinavia.

Korea's First Fertilizer Plant Is Opened At Chung-Ju

A section of Korea's first fertilizer plant at Chung-Ju, South Korea. The plant was built at a cost of \$40 million, financed mainly by the U. S. International Cooperation Administration. Operations began last month. The plant will produce 250 metric tons of urea per day.



Bunker Hill Names Hewitt

William G. Hewitt, marketing analyst for the Bunker Hill Co., San Francisco, has been appointed assistant to the president.

Prior to joining Bunker Hill in October, 1958, Mr. Hewitt had been president of the Pacific Guano Co. in Berkeley, Calif. He also had been vice president of the Pacific Chemical and Fertilizer Co. in Honolulu.

Three In Cyanamid Shifts

The agricultural division of the American Cyanamid Co., New York, has realigned three of its research scientists. Dr. J. T. Thurston has been named manager of research and development; Dr. E. L. R. Stokstad is director of research in biological sciences, and Dr. T. H. Jukes is director of chemical research.

The technical department, under the supervision of Dr. Thurston, has been re-named the development department and will continue under his direction.

To Control Fungus Disease

Allisan, to be marketed shortly by Boots Chemists, Nottingham, England, is said to combat grey mold, the principal fungus disease of hot house lettuce.

To be sold in the form of a yellow powder which is mixed with the soil before planting or used afterwards as a dust, Allisan contains a nitrated chloro-aniline derivative.

Korea's first fertilizer plant, built at a cost of \$40 million, was opened last month at Chung-Ju on the Han River about 70 miles south of the border between North and South Korea. The plant will produce 250 metric tons of urea daily and is expected to save Korea \$10 million in foreign exchange each year.

Financed mainly by the U. S. International Cooperation Administration (ICA), the plant will satisfy about one-third of the country's fertilizer needs. The plant installation consists of a power plant, ammonia plant, urea plant, administration and maintenance facilities, storage areas and coverages, and water plant. The power plant

has two boilers, built by Combustion Engineering of New York, and three turbine generators.

Most of the materials essential to construction had to be shipped from the United States, unloaded at Korean ports, and then transshipped by railroad and truck to the plant site. The builders, F. H. McGraw and Co. and Hydrocarbon Research, Inc., operated under the name of McGraw-Hydrocarbon.

The Korean government has signed a contract with a German company for the construction of a second urea plant at Naju which will have a production capacity equal to the Chungu plant. No date has been set for construction, however.

Farm Fertilizers Expands

Farm Fertilizers, Inc., Omaha, Neb., has acquired the real estate and physical assets of the Agricultural Products Corp., Webster City, Iowa. The facilities will be operated as a branch of Farm Fertilizers.

Last August, Farm Fertilizers purchased the General Fertilizer Co. of Fremont, Nebr.

Soils Analysis Service

The United States Testing Co., a testing and research firm with laboratories in major farm areas, is offering a soils analysis service that they say will provide test reports two days after receipt of sample. Price per sample depends upon the number of samples submitted during a year.

The service is expected to be of interest to fertilizer manufacturers, large food processors, and large farm corporations. Complete information is available from the company's Memphis laboratory at 214-215 Cotton Exchange Building, Memphis 3, Tenn.

Manager of Detroit Sales

Walter J. Kilmer has been made manager of the Detroit sales division for the U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., New York. He succeeds Fred M. Henley, who is retiring.

Mr. Kilmer, who has been associated with U.S.I. for 25 years, had been a sales representative at Buffalo, N. Y.



HERE'S A FAMILIAR SIGN OF U.S.I. SERVICE TO MIDWEST FERTILIZER MANUFACTURERS

If your fertilizer plant is located in the Midwest, you've seen many a U.S.I. tank car in freight trains speeding across the countryside. The traditional U.S.I. oval is a familiar symbol of dependable, prompt service from our three plants in your area.

Now our new color-coded domes let you identify the product in the tank car at a glance:

Ammonia (Bright Yellow). U.S.I. ships Anhydrous and Aqua Ammonia from its Tuscola, Illinois plant.

Nitrogen solutions (Bright Red). The Tuscola plant supplies 16 different nitrogen fertilizer solutions, including urea types, to meet a variety of formulation requirements.

Phosphatic fertilizer solution (Bright Orange). Tuscola produces P_2O_5 in the form of PFS (wet process phosphoric acid, 52-53% P_2O_5). With U.S.I.'s PFS, you can frequently cut costs for regular and special granular grades . . . and make higher analysis goods as well.

Sulfuric acid (Black). U.S.I. produces all concentrations of sulfuric, including oleum, plus good spent acid of fertilizer quality at three points: Tuscola; Sunflower, Kansas; and Dubuque, Iowa.

Prompt deliveries are as traditional with us as our U.S.I. oval. So is technical assistance on equip-

ment, materials, formulations — any problem involving production and costs.

For basic fertilizer chemicals or for help in using them, contact Heavy Chemical Sales, U.S.I. — New York office. Write or call collect — OXford 7-0700.

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Position

Company

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City State

☐ I'm a fertilizer manufacturer

☐ I manufacture

I use — or plan to use:

☐ Ammonia, Nitrogen Solutions

☐ Phosphatic Fertilizer Solutions

☐ Sulfuric Acid

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99 Park Avenue, New York 16, N. Y.

How and why..



WONDERWALL, West Virginia's new multiwall bag made with Kraftman Clupak paper, is inspected by industry leader Robert S. Gerstell, President, Alpha Portland Cement Company, Easton, Pa. "This isn't the first time we've introduced revolutionary advances for the sake of better operations in our plants . . . and for our ultimate customers," Mr. Gerstell states.

...ALPHA CEMENT changed to multiwalls of West Virginia's Clupak* Paper

When the new tougher Kraftsman Clupak paper was being introduced by West Virginia Pulp and Paper Co., the Alpha Portland Cement Co., Easton, Pa., major producer of Portland and mortar cements, did its own testing.

This was only natural for a leading company in the industry—with eight plants in the East, Midwest and South. Alpha's president, Robert S. Gerstell, foresaw the tremendous possibilities of Kraftsman Clupak paper, especially in terms of customer satisfaction and operating economy. With his guidance, Alpha was the first major cement company fully to realize the potentials of this new West Virginia paper!

Alpha's purchasing agent, James I. Maguire, directed the test program which compared Alpha's then current, natural kraft multiwalls with bags made of the new Kraftsman Clupak, the paper with built-in stretch.

Filling, handling and shipping were all examined. On every count, the new Kraftsman Clupak paper bag proved its superior toughness!

Construction of the natural kraft bags, to carry 94# of Portland cement, was 2/40, 2/50 totalling 180# paper basis weight. The new Kraftsman Clupak bags

were 1/50, 1/50, 1/50 totalling 150# paper basis weight. Savings on the paper basis weight reduction of 30# amounted to \$2.75 per M bags.

But more important—bag breakage in shipments of both Portland and mortar cement has become negligible! And complaints from supply dealers have been reduced to a minimum.

Today, virtually all multiwalls used by Alpha, from whatever supplier, are made of Kraftsman Clupak paper. And naturally, Alpha is using West Virginia's own bag, called WONDERWALL.

If you pack fertilizer, feed, cement, flour, chemicals or like products, see how you can *cut costs* and satisfy customers *better* with WONDERWALL. Write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y.



West Virginia Pulp and Paper

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority.



TEST MASTER. James I. Maguire, purchasing agent of Alpha Portland Cement Company, says: "The success of bags made from Kraftsman Clupak paper, due to sheer toughness, was extraordinary from the start. They are not only tougher . . . they make possible realistic savings in bag costs."



WONDERWALL PROVING GROUND #1. Actual handling of WONDERWALLS and other bags made with Kraftsman Clupak paper—in comparison with the old, natural kraft multiwalls—proves the superiority of Kraftsman Clupak paper. No problems with filling, opening, stacking or shipping.

Pre-Emergence Herbicides

We're nearing the time when pre-emergence applications of certain chemicals in granular or spray form will do a good job of holding down crabgrass, Ronald Campbell told persons attending the tenth annual Central Plains turfgrass conference at Kansas State University, Manhattan, Oct. 21.

Mr. Campbell's remarks came on a tour of K-State's experimental crabgrass control plots and turfgrass garden. He is a member of K-State's department of horticulture.

He said that the interest is in control of crabgrass through pre-emergence applications, and several chemicals looked good in K-State tests this year. Among materials killing 95 per cent or more of the crabgrass through applications made in mid-April were (P-Chlorophenyl phenyl acetoneitrile (L 09726), 2,3,6-trichlorophenyl acetic (M673A), and the experimental materials Dow 1329 and DAC 893.

Du Pont To Build

A new plant to make methylamines and pharmaceuticals will be built at the Du Pont Company's Belle, W. Va., site. The new plant will more than double Du Pont's capacity for methylamines, now made at the Houston, Tex., Works.

Construction by the company's Engineering Department will begin early next year with completion expected in the first quarter of 1961.

New Use For Bentonite

Bentonite, used chiefly to control the viscosity or stickiness of oil well drilling mud and as a carrier for insecticides, recently has been used to check many serious forest fires in Canada.

Canadian Forestry Department officials report that mix manufactured from bentonite is used to plaster trees in the fire zone and it continues to spread after reaching the ground, setting up obstacles against the flames. It is said to be effective for 24 hours.

Airplanes were used to deliver the liquid bentonite to check fires in mountainous areas.

CCC, A New Growth Regulator

A new growth regulating chemical which makes plants short and stocky has been discovered at the Michigan State University Agricultural Experiment Station, East Lansing, Mich.

The chemical, dubbed CCC, could bring about some basic changes in agriculture. It may be one of the more important chemical compounds which man needs to more completely control the plants he grows.

CCC, short for 2-chloroethyl trimethylammonium chloride, was discovered by Dr. N. E. Tolbert, professor in agricultural chemistry. The development of the chemical was an outgrowth of his basic work on choline compounds in plants. The chemical has been tested at the Michigan station on wheat, cucurbits, poinsettias, tomatoes, and other plants.

CCC and related compounds do not appear to be very toxic to animals. They are, however, closely related chemically to compounds which inhibit cholinesterase, a more important mechanism involved in nerve stimuli in animals.

Investigators at Michigan State University are particularly interested in the fact that the short and stocky plant growth obtained from treatments with CCC is the opposite from the tall and elongated growth obtained by treatment with gibberellin, another type of plant growth stimulator. The actions of the two types of chemicals toward stimulating plant growth are mutually antagonistic; that is, one type of chemical will offset and reverse the response brought about by the other.

More complete control over plant growth might be obtained by teaming CCC up with gibberellic acid. It may be possible to time treatments so that advantages offered by each chemical could be obtained.

Ekberg In New Position

J. Paul Ekberg, Jr. has been appointed to the new position of product director for agricultural chemicals in the Organic Chemicals Division of the Monsanto Chemical Co., St. Louis, Mo. He had been assistant director of sales planning for the division.



As product director Mr. Ekberg will be responsible for planning, recommending, coordinating, and evaluating the results of the division's research, development, engineering, manufacturing, and sales of agricultural chemicals.

Monsanto Buys Site

Monsanto Chemical Co., St. Louis, Mo., has acquired options on 450 acres of potential industrial property near Oxnard, Calif. At least four tracts are involved in the property which includes more than a mile of Pacific shore line. The site is approximately 60 miles north of Los Angeles and is served by the Ventura County Railway. Monsanto did not disclose its plans for this new West Coast site.

U. S. Borax Appoints Taylor

Dr. D. S. Taylor has been appointed president of the U.S. Borax Research Corp., a subsidiary of the U. S. Borax & Chemical Corp., Los Angeles. At the same time, Dr. C. L. Randolph was named vice president.

Cyanamid In New Building

The American Cyanamid Co. became the first tenant to occupy space in the new 48-story Time & Life Building at Rockefeller Center in New York. 850 Cyanamid employees occupy an area exceeding 100,000 square feet on the 5th and 6th floors of the new building.

Begins Clupak Production

The Continental Can Co. has begun production of Clupak paper at its Hodge, Louisiana paper mill. The company is producing approximately 250 tons per day of extensible paper for general converting purposes, with special emphasis on multiwall sacks.

Retires From CIL After 43 Years

Clare W. Jarvis, assistant sales manager of the agricultural chemicals division of Canadian Industries Limited, was presented with a camera by his colleagues at a recent reception in Toronto on the occasion of his retirement from the company after 43 years in the fertilizer business. Mr. and Mrs. Jarvis and daughter, Valerie, were also honored by the Ontario Plant Food Council at a dinner in the Royal York Hotel.

Mr. Jarvis joined C-I-L in 1937 as Toronto sales manager of the fertilizer division after a number of years of experience with other fertilizer firms and three years service in World War I with the Royal Air Force. He was appointed Ontario district sales manager in 1940 and assistant sales manager of the entire agricultural chemicals division in 1950. He was secretary of the Plant Food Producers of eastern Canada and a member of the Toronto Board of Trade.

SALES CLINIC

(From Page 37)

changes as you go along, but your detours will be fewer and shorter.

Sales Tools

A presentation without the use of sales tools can be boring and uninteresting to your customer. Sales tools are anything you can use to *show* your prospect that fertilizer gives him the benefits which meets his needs and desires. Here are a few sales tools that can be used effectively:

- Demonstration Plots
- Photographs
- Testimonials
- Dealer and Farmer Meetings
- Case Histories
- Reprints of Articles
- Simple Charts

Visual facts and figures

You can make these up yourself or get the help of a local printer.

Selling Quality

Although discussed last, — selling quality is one of the first things you have to think about in making a sale. Selling premium grades of

fertilizer and superior service. Any product must offer more than price, if it's going to stay on the market, and the manufacturer is going to stay in business. In the fertilizer business, the quality of the product and service can result in direct benefits — like greater yield, lower costs, more profit, and increased value of capital investment.

Remember that buying motives and needs — increasing the business from present customers, — soil testing — credit — organization of information — planning the sale — sales tools — and selling quality, are basic to **SELLING IN THE FERTILIZER BUSINESS.★★**

Expands Phosphorus Output

The Mineral Products Division of Food Machinery & Chemical Corp., New York, has expanded production at its Pocatello, Idaho, phosphorus plant. The plant, largest west of the Mississippi River, has been in production since 1948.

Purdue Pesticide Conf.

A pesticide conference, covering herbicides, fungicides, and insecticides, will be held Jan. 25 and 26, 1960, at the Memorial Center of Purdue University, Lafayette, Ind. The conference will feature discussions of latest developments and 1960 recommendations in the areas of weed, insect, and plant disease control.

NPFI Research Grants

The National Plant Food Institute had awarded eight grants-in-aid for research in the fertilization of forest trees.

The grants went to: Dr. C. W. Ralston, Duke University; Dr. L. J. Metz, U.S. Forest Service, Union, S.C.; George Sparrow, Southeastern Tidewater Experiment Station, Fleming, Ga.; Dr. George Switzer and Dr. Lyle Nelson, Mississippi State University; Dr. Claud Brown, Texas Forest Service, College Station; Prof. John Hamilton, University of Georgia; Dr. T. E. Maki, N.C. State College; and Dr. Paul J. Kramer, Duke University.

Brevities

K. R. HEDRICK has been named production superintendent at the East St. Louis, Illinois, plant of the American Agricultural Chemical Co. He had been superintendent at Danville, Ill.

AC

ROGER OLMSTEAD, has been named manager of the fertilizer division of Northwest Cooperative Mills, St. Paul, Minn. He had been manager of the cooperative's plants in Green Bay, Wisc.

AC

JOSEPH A. HOWELL of Richmond, Virginia, has resigned as chairman of the Fertilizer Committee for Tax Equality, and no longer is a consultant to the National Tax Equality Association.

AC

D. M. WEATHERLY Co., Atlanta, Ga., has erected a multi-purpose granulating unit for the Coastal Chemical Corp., at Pascagoula, Miss.

AC

JOHN L. QUAIL, Fresno County farm advisor, was the third recipient of the American Cyanamid Co.'s silver plaque award given to outstanding county agents. The award was presented last month at ceremonies in Fresno, Calif.

AC

NICHOLAS J. KOCKLER, former assistant industrial relations director of the United States Potash Co. division of the United States Borax & Chemical Corp., Los Angeles, has been named corporate director of public relations of U. S. Borax.

AC

HENRY GOULD has been named technical director of Gallowhur Chemical Corp., Ossining, N. Y. He joined the company last year as chief chemist.

AC

FRED W. STRUFE has been appointed Atlanta, Ga., representative for the Bartlett Tree Experts, Stamford, Conn. He has been a tree specialist for 32 years.

Equipment, Supplies, Bulletins

Carbide Surfactants Info.

A 44-page booklet, describing the properties and uses of Tergitol surfactants, has been published by the Union Carbide Chemicals Co., division of Union Carbide Corp., New York.

The booklet contains extensive data for eight nonionic and four anionic Tergitol surfactants, including selection, solubilities, properties, formulations, applications, performance, specifications and test methods, shipping, bulk storage, and physiological properties.

Field Trials Folder

Florida Field Trials, Belle Glade, Fla., has prepared a folder listing its prices for agricultural services. Among the services offered by the organization are studies concerning foliar fungicides, soil fungicides, seed treatments, insecticides, residues, herbicides, nematocides, and growth stimulants.

IMC Plant Food Film

The Agricultural Chemicals Division of the International Minerals & Chemical Corp., Skokie, Ill., has produced a sound motion picture, "Sparkplugs of Plant Nutrition," that currently is available for vocational agriculture classes, farm organizations, county agents, and other interested groups.

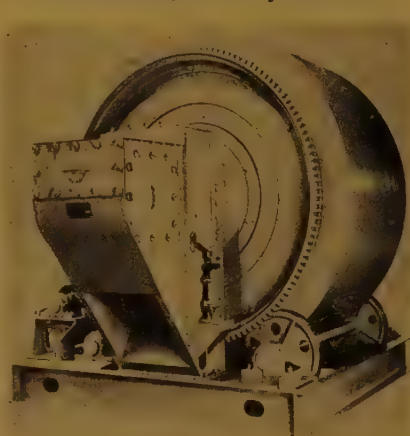
The film, which demonstrates how fertilizer makes possible bigger crops and better profits, is available through Modern Talking Picture Service, Inc., 3 E. 54th St., New York 22.

Despatch Oven Catalog

The Despatch Oven Co., Minneapolis, Minn., is offering a reference catalog that provides basic information about laboratory ovens, pilot plant ovens, and small batch

type production ovens. The catalog is available from the company at 619 S.E. Eighth St., Minneapolis 14.

Air-Actuated, 4-Way Mixer



A remote-controlled, air-cylinder-actuated fertilizer mixer, with a capacity of up to two and a half tons per batch (50 to 65 tons per hour) has been developed by the Sturtevant Mill Co., Dorchester, Boston, Mass.

The unit is vented to allow immediate expulsion of steamy corrosive vapors, and is engineered to eliminate the need of spout and elevator at point of discharge. The unit feeds directly into a granulator-cooler. The new mixer is being made available in capacities of from a quarter ton per batch (4 to 7½ tons per hour) to the 50-65 tons per hour mixer pictured.

New Bin Level Indicator

A new, automatic bin level indicator, especially intended for applications where corrosion and chemical action may be factors, has been introduced by the Bin-Dicator Co., Detroit, Mich.

The device is said to be extremely responsive to changes in pressure of materials. It functions as effectively in controlling levels of light, low density materials as it does when handling heavy, dense, coarse, or abrasive materials. It can be affixed to bin walls or suspended within a bin at any desired level.

New Extension Booklets

Two new extension booklets recently were released by the agricultural extension services. The University of Georgia College of Agriculture, Athens, has prepared a folder on the use of lime and the Division of Agricultural Sciences of the University of California is offering a cotton defoliation guide.

Omega Gravimetric Feeder

B-I-F Industries, Inc., Providence, R. I., has prepared a booklet describing its Hi-Weigh Belt Gravimetric Feeder, a machine for continuously weighing and feeding dry materials at high rates.

The bulletin contains several photographs of the feeder plus dimensional drawings, and a description of its operation. It is available from the company at 345 Harris Ave., Providence 1.

Carbide Folders On Sevin

The Union Carbide International Co., Division of Union Carbide Corp., New York, is offering folders that describe the use of Sevin on fruit. The insecticide recently was registered in South Africa as a cattle dip and spray concentration for protection against ticks.

Self-Cleaning Dust Collector

The Flex-Kleen Corp., Chicago, is offering a new dust collector which has no moving parts. It is said to provide constant air flow and pressure drop, plus automatic filter tube cleaning. Complete details are available from the manufacturer at 406 S. Plymouth Court, Chicago 5, Ill.

Fairfield Technical Folder

A technical bulletin describing the new Fairfield Residual Concentrate No. 1—a combination of Pyrenone and Malathion—has been prepared by Fairfield Chemicals, Food Machinery & Chemical Corp., New York.

The bulletin describes the concentrate and its properties and offers a sample label.

Selector For Spray Rigs



The Spraying Systems Co., Bellwood, Ill., has announced the development of the DirectoValve, a control valve and selector for spray rigs. The valves are supplied in one, two, three, or four outlet port designs.

Shown here is a two-outlet-port DirectoValve for use with a two-section boom to permit spraying to either side of the rig or to both sides at one time. The valve provides a by-pass when closed, thereby protecting hose lines, fittings and pump from the effects of excessive pressure build-ups.

CSMA Proceedings Published

The proceedings of the 45th mid-year meeting of the Chemical Specialties Manufacturers Association have been published and are available at a price of \$7.50 per copy. The 204-page book contains all papers, discussions, and committee reports presented at the meeting, held in Chicago last May.

General American Catalog

The General American Transportation Corp., Chicago, has published its 1960 catalog of services and products for the process industries.

Among the products pictured and described in the catalog are: Louisville dryers, coolers, and de-waterers; mixing devices; tank storage terminals; plastic valves and fittings; and railroad tank cars.

Automatic Weighing System

A system that automatically weighs and fills drums or valve bags at a rate up to 600 lbs. per minute is offered by the Richardson Scale Co., Clifton, N. J. Heart of the system is Richardson's E-50 scale.

Improved Feed Compound

The Industrial and Biochemicals Department of the E. I. du Pont de Nemours & Co., Wilmington, Del., now is offering an improved "Two-Sixty-Two" feed compound for use in ruminant feed formulations.

The new compound is free-flowing and non-caking, the company said, and can be used in either continuous or batch mixing operations.

Mercury Vapor Detector

Concentrations of mercury vapor can be detected in the range of 0 to 1.0 milligram per cubic meter by the M-S-A Mercury Vapor Detector, developed by Mine Safety Appliances Co., Pittsburgh. The detector is portable.

Amoco Panasol Booklet

A booklet describing the Panasol aromatic solvents for insecticides is being made available by Amoco Chemicals, Chicago.

Bulletin No. A2, the booklet provides information on three Amoco solvents; Panasol RX-4, Panasol AN-2K, and Panasol AN-2. Listed are specifications and typical properties, handling precautions, and phytotoxicity data. The booklet is available from the company at 910 S. Michigan Ave., Chicago.

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24-million BTU/Hr capacity Renneburg Refractoryless Furnace used with 8' dia. x 60' Dryer (left), parallel with 8' x 60' Counter-Current Cooler.

Renneburg Rotary Drying Unit (behind Counter-Current Cooler in foreground) — Equipped with 5-compartment insulated cloth-type collectors, having orlon dust tube filters for effective air pollution control.



Literature and information on request.

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PESTICIDE PROMOTION

(From Page 49)

tools: Farm Television, Radio, State Farm Papers, Regional Farm Papers, National Farm Magazines, Local Newspapers, Horticultural Publications, Specialized Trade Publications, Displays, Counter Cards, Window Streamers, Posters, Literature, and Booklets?

In the area of sales promotion, are we working with these sales development tools: Motion Pictures for use with your trade and with your farm customers, Incentive Contests, Trade Shows, Horticultural Programs, Organized Presentation Kits for your salesmen?

In summary, I have tried to point out the role of advertising in our industry; the urgent need for development budgets on advertising and promotion and an indication of some of the tools that you may wish to consider in the development of your own program.

I would like to close by quoting from Mr. Charles Mortimer, President of General Foods. Mr. Mortimer in commenting on his 96 million dollar advertising budget said: *"One thing our long experience has taught us, is that the surest way to overspend on advertising is not to spend enough to do a job properly. It's like buying a ticket half way to Europe. You have spent some money, but you just haven't arrived."*

And I might add, "Fellows, it's a helluva long swim home!"★★

NAC MEETING

(From Page 40)

(1) Nematocides, plant regulators, desiccants, and defoliants must be registered.

(2) Tolerances on raw agricultural commodities must be obtained through the provisions of the Pesticide Chemicals Amendment in all cases where residues are found to be present on food.

From the standpoint of the Pesticides Regulation Branch, the

new law creates a number of rather interesting problems. For one, the bill contained no authorization for funds to administer the Act. Unless this budgetary problem is solved promptly, it will result in exceedingly slow action on applications for registration, and this will affect older products as well as new ones as the work load increases. Furthermore, with a new law to enforce, recruiting of a competent staff (specialists in the new fields) is a prime responsibility.

"To bring this law into direct line with the Food Additives Amendment to the Federal Food, Drug, and Cosmetic Act," Mr. Ward advised, "the following limits are set:

"(1) Where the use of a nematocide, plant regulator, desiccant or defoliant leaves a residue on a food, and that pesticide was in commercial use prior to January 1, 1958, the enforcement features of the law shall be applicable on March 5, 1960, or such later date not beyond March 5, 1961, as the Secretary may prescribe, or on the date of registration, whichever date first occurs.

"(2) Where the use does not result in residues and the pesticide was in commercial use prior to August 7, 1959 (date of enactment), the enforcement features shall also be applicable, as outlined above.

"It must be noted that there is no formal postponement for those products which leave residues on foods and which were put into commercial use after January 1, 1958, and before August 7, 1959. Such pesticidal residues are now subject to Section 406 (a) and clause (2) of Section 402 (a) of the Federal Food, Drug, and Cosmetic Act, which will apply after March 5, 1960, or March 5, 1961, or until tolerances have been established, whichever date first occurs. It is also important to remember that all new nematocides, plant regulators, desiccants or defoliants must be registered before being

shipped in interstate commerce."

A discussion on the effective date provisions of the 1959 amendment was presented by Joseph A. Noone, NAC technical adviser, who pointed out that Section 3 of the new bill provides that "certain sections of the Insecticide Act and of the Food, Drug & Cosmetic Act, would not be applicable to some of these products until March 5, 1960 or such later date or dates, not beyond March 5, 1961, as the Secretary of Agriculture and the Secretary of Health, Education, and Welfare might prescribe on the basis of determinations that such postponement was necessary to avoid hardships and would not be unduly detrimental to the public interest."

NACA plans to request that the extension of time provided for in the Amendment be granted, pointing to the difficulties and hardships involved in trying to bring these products into compliance by March 5, 1960. "We do anticipate that there will be some extension beyond March 5, 1960," advised Mr. Noone. He cautioned, however, that in the discussions with members of the Congress and representatives of the federal regulatory agencies, "we found no disposition to grant any further extension of time as regards the regulations of these chemicals but, to the contrary, encountered strong opposition to any such extension." Thus, companies manufacturing or formulating nematocides, plant regulators, defoliants and desiccants should immediately begin to collect such data or make such label revisions as are necessary in order to bring their products into compliance with the Federal Insecticide, Fungicide, and Rodenticide Act, and the Miller Amendment to the Federal Food, Drug, and Cosmetic Act. At this point, the closing date is still March 5, 1960!

Guest speaker, Earl L. Butz, dean, school of agriculture, Purdue University, addressed the NAC members at a luncheon, October 21st, with a commentary on "The

New Look in Agriculture." Although we have about 4.6 million farm units in the United States, observed Mr. Butz, slightly less than 2 million of these commercial family farms, produce approximately 90 per cent of all food and fiber entering into commercial trade. It is also expected, he said, that the trend toward fewer farms, producing more of the total farm products will continue.

Based on several visits to Europe, Central and South Ameri-

ca, and the Far East, Dr. Charles E. Palm, Cornell University, reported to NAC members on world pest control developments.

He confirmed previous observations that farming in foreign countries (with a few exceptions) is quite backward,—and that our modern tools don't fit the processes. He indicated too, that there is little development or research in countries outside of Western Europe, although a number are doing some formulating.★★

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P-9

CENTRAL CHEMICAL CORP., Hagerstown, Md., has purchased the agricultural chemicals department of the Newton Chemical and Supply Co., Bridgeville, Del.

AC

CLYDE V. JOHNSON has been appointed manager of the central sales division of the Denver Equipment Co., Denver, Colo. The company manufactures mineral and chemical processing equipment.

EDITORIAL

(From Page 29)

flexible enough to rapidly meet changing demand."

It is difficult to predict with certainty the eventual fate of this trend which has been apparent in the agricultural chemical business over the past five or ten years. Some national companies have succeeded in eliminating the intermediate steps from their marketing patterns, and particularly where they

had a "hot" product at the moment to ease their direct access to the end user, they have succeeded in by-passing the formulator and local distributor. Often, incidentally, they have achieved their greatest success only by duplicating the local facilities and service which the formulators offer. Other basic producers have been much less successful. They have missed the services of the local experts who know the area, know the buyer and his credit picture, and are able to operate without "big company" overhead.

We would say that, at this stage at least, the returns are not all in. And, if called upon to predict, we would have to hazard the guess that some direct sellers will continue to do well, some poorly, while the well run local formula-tor-distributors will be around for a long while, making money out of situations and customers that would inevitably turn up as red ink on the big company's books.★★

PESTICIDE SALES

(From Page 45)

our customers on the economic, safe and productive use of 2,4-D in areas where sensitive crops are grown, or where the product is used only to a limited degree.

To me 2,4-D is one of the truly miracle products to come to light in the pesticide field in the last 15 years. Just 12 years ago if you had told your neighbor that your 14 year old son could kill twenty million weeds an hour in a growing crop for 50¢ (the cost of one pint of 2,4-D) they would have thought you were crazy. To do a bit of quick figuring, a 20 foot boom sprayer operating at 4 miles per hour will spray 10 acres of corn an hour. Fifty weeds per square foot (a mild infestation, multiplied by 400,000 square feet equals twenty million weeds.) Think of it! What industry can tell a more dramatic story. Yet the sad fact is that those of us who are active in the marketing of 2,4-D products have not been happy with the profit margins for the past 5 years.

Under the present marketing conditions for agricultural commodities, the key to better farm income lies in reducing the costs of production. Scientists report that weeds cost farmers 5 billion dollars every year. It is estimated that if farmers would apply the knowledge on the use of new chemicals for controlling weeds, this loss could be cut in half. This would add 2½ billion dollars annually to the income of farmers in the United States. Some 16% of farm income is bound up in the costs for tillage; half of this tillage is necessary only because of weeds.

Industry and government experts proved many times over that the elimination of competition by weeds within a crop can increase the yields as much as 30% and at the same time give a better quality product and increase the marketable portion of each crop. A farmer in the South reported that by using herbicides he reduced costs of

Raymond MULTIWALL BAGS

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weeding his cotton 50% and did the job with 1/10 of the labor usually required. Similarly, wheat farmers in the central portion of the United States are using 25¢ worth of herbicides per acre to control mustard in wheat—a weed that previously could not be controlled.

In the April, 1957 special issue of the *National Agricultural Chemical Association News and Pesticide Review*, the economic benefits of pesticides were reviewed. This issue outlined briefly some of the ways we might dramatize the economic benefits of pesticides. I believe we as businessmen and salesmen have reason to question our past performance when we realize that we have been busy cutting the price rather than dramatizing the economic and other benefits that can result from the use of pesticides.

Statements by various authorities such as the following, have had little follow up or emphasis in our commercial merchandising and sales programs:

From a USDA TV program Released in Feb., 1957:

"Seed treatment can give a dollar return for each cent of investment. Seed treatment for cotton resulted in increasing income by \$25.00 more per acre.

"Chemical weeding saves \$50 to \$70 per acre in onion fields according to the Ohio Experiment Station.

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Most experts feel that these estimates are quite conservative. They are based upon an estimated increase in value through higher yield, improved quality or lower production costs due to the use of chemicals.

I believe manufacturers, formulators and distributors as well have brought about many of the

difficulties which face us today, particularly when it comes to declining profit margins. Less reliance (dependence) upon consignment selling procedures and preferred arrangements, plus increased and more specialized sales promotion, could provide the answer to our problems. It has been proven many times that people never buy a product or a service. They always buy what that product or service will do for them. That is, they buy *results*! What we need

then are more salesmen merchandising and selling pesticides who can translate a product feature into a customer benefit or result. Basic knowledge? Perhaps—yet the truth is that our industry has been plagued by selling practices which emphasized the features of the product or service rather than the results—and often the main feature emphasized was lower price.

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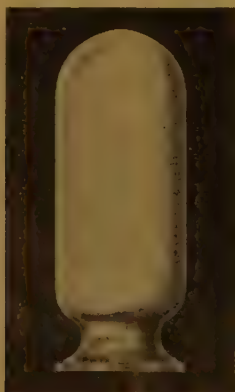
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distributors, we will supply these
resellers. I do not agree that a
strong local and active dealer
should be, or will be, completely
bypassed in the future.★★

WACA MEETING

(From Page 52)

losses represent a cost of doing business and must necessarily be reflected in market prices. If these prices are forced up needlessly, they may also tend to limit the use of necessary products.

He urged that the public be educated to the fact that liability is not just a seller's or user's problem, but is everybody's problem in the joint effort to produce a better crop.

To minimize liability, strict compliance with labeling must be observed. If there is a casualty on a spraying job, and any departure from the labeling instruction can be proved, the guilty parties are sure to suffer. In conclusion, he outlined four safe-guards to eliminate the possibility of costly law-suits; 1. correct labeling, 2. be able to prove that the label was on every container, 3. keep the sales-men's story in line with the label and printed sales material, 4. when possible, get a written state-ment from the purchaser absolv-ing the manufacturer from lia-bility.

C.M. Stutfield, general credit manager of the California Spray Chemical Corp. discussed "Credit Philosophy." Mr. Stutfield insisted that firm credit control is not an

impediment to increased sales, con-trary to this general charge, usually made by sales departments.

He briefly explained a six-month study which Cal Spray con-ducted among their customers, both those with good credit and less than average credit ratings. He said they found that concerns which were credit risks had in-creased their purchases from Cal Spray during that period at a rate ten times as great as that of the

poorer credit risks, and also that the profit margin increased pro-portionately among the good credit risk companies.

Eugene Heckathorn of United Heckathorn spoke on "Inventory Controls." (See page 55 for part 1 of this complete paper.)

The second panel covering marketing aspects of the agricul-tural chemical industry will be heard at the March meeting of WACA. Included on that panel



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will be those talks originally scheduled for delivery at this meeting: Mr. C. E. Cody, regional manager, California Spray-Chemical Corp., speaking on "Market-Trends in the Western States". A. B. Horner, manager, Nematocide Division, The Best Fertilizer Co., discussing "Fertilizer-Pesticide Mixes," and C. W. Shockley, speaking on "Aerial Spray Programs."

AERIAL SHOW

(From Page 72)

equipment and aircraft; and the Shell International Chemical Co., Ltd., London, whose exhibit features chemicals that are available throughout the world for aerial use.

The aerial demonstration was preceded by three days of discussions about European agricultural aviation and such topics as the solution of the short season problem faced by aerial applicators in England.★

AIR TRACTOR

(From Page 67)

to secure light, yet dependable, components. It appears, however, that 50 pounds of weight could be saved in a typical spray-dust system if light weight nozzles, pumps, and valves were available and selected for the particular performance required. It might be noted here that a tractor rarely carries its own spray or dusting equipment.

The conclusions reached in this article have been, up to now, the private conclusions of the author who feels that the agricultural applicator does not want a flying tractor anymore than the farmer wants an airplane to pull a plow. Recent years have seen the development of agricultural airplanes that will serve the particular needs of any applicator. He must just decide what he would like his airplane to do and then pick the one that comes closest to his ideal.★★

THE CONSOLIDATED MINING AND SMELTING Co., Trail, B. C., plans to install a urea plant at its Calgary, Alberta site. The plant, to be completed in ten months, will supply prilled urea.

AC

HARROLD KITCHENS has joined the Davidson-Kennedy Co., Atlanta, Ga., as manufacturers sales engineer. His office is in Macon, Ga.

FOREST SPRAYING

(From Page 64)

ple, in certain cases in the United States. The Canadian policy is the most conservative possible and, in practice in both the Atlantic area and British Columbia, it has meant that only a fraction of total outbreak area has been treated in any one season. Apart from the physical and economic impracticability of treating entire areas involved in full-scale outbreaks such as those of the spruce budworm in Eastern Canada in recent years, and the necessity of considering costs, the policy is believed to give the best possible chance to natural control to exert a full effect and at the same time to minimize the dangers of adverse effects against other forms of life.

The Spruce Budworm Problem

The spruce budworm is the most destructive of Canada's forest pests. Infestations have been reported from some part of Eastern Canada almost every year for the past 40 years and widespread outbreaks involving tremendous losses of timber are known to have occurred periodically for more than 150 years. The seriousness of this kind of recurring threat becomes all the more evident when one considers that Canada is above all a forest country — where forest industries, notably pulp and paper, lead all others as a source of foreign exchange.

Although chemical control has been practiced in Canada on as large a scale as anywhere in the



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world, Canadian forest entomologists have traditionally subscribed to the philosophy that the ideal in forest insect control is prevention rather than cure. For several decades, keen and active interest has been shown in this country in biological control, involving the propagation and release of natural enemies from abroad — parasites, predators and disease microorganisms. So far, however, success by this method has been chiefly against introduced pests, such as the European spruce sawfly, that evidently arrived on this continent without a full complement of natural enemies. Greater promise for ultimately minimizing the threat of recurring damage by native insects such as the spruce budworm appears to lie in the creation of more resistant forests by silvicultural means. A good deal of time is required for this, however, first to gain an adequate understanding of the silviculture of our Canadian forest types, and second, to imple-

ment the essential forestry practices.

With respect to the research aspect it is appropriate here to mention the intensive investigations of the possibilities of management in spruce budworm control that have been underway in New Brunswick since before the present outbreak, in 1945. Known as the Green River Project, this is a collaborative undertaking involving, in addition to the Division of Forest Biology, the Forestry Branch of the Dept. of Northern Affairs and National Resources, the Dept. of Lands and Mines of New Brunswick, and Fraser Cos., Ltd., the pulp and paper company on whose lease-hold the studies are being conducted.

Despite outstanding progress in such basic studies as these, however, the completely resistant forest is likely to remain an ideal for many years to come. In the meantime, direct measures offer the sole means of checking current out-

breaks that menace inventories of raw material for established industries and threaten to disrupt the management plans upon which sustained yield and the ultimate production of resistant forests depend. Nowhere else in the world has the development of the aerial application method against forest insects been more logical than in Canada and it seems safe to say that it will continue to be used with increasing efficiency against an increasing number of pests.

Adverse Effects

There also has been a keen awareness among Canadian forest entomologists of the possibilities of adverse effects from large-scale chemical control. The Lake Nipigon spraying operations of 1945-46 were preceded in 1944 by a series of tests of effects of DDT on fish and invertebrate aquatic life, amphibians and reptiles, and birds and small mammals. These were somewhat limited tests but they showed



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what has since been corroborated a number of times, that field applications of DDT are toxic to most other forms of animal life, particularly to aquatic and amphibian forms. They also suggested, however, that severe or lasting damage would be unlikely from the low dosages that appeared to be sufficient for a high percentage kill of the pest population. Certainly, it was felt, this damage would be unlikely to match the disruptive effect on the forest community of allowing widespread severe spruce budworm damage to go unchecked.

It has been a somewhat fateful coincidence that subsequent Canadian aerial forest spraying has been carried out on extreme opposite sides of the country, on the Atlantic and Pacific seaboard, against spruce budworm in the East from 1952 to 1958 and against black-headed budworm on Vancouver Island in 1957. Both operations affected spawning streams of important game and commercial salmon species — the Atlantic salmon in New Brunswick and Gaspé and Coho and other western salmon species in British Columbia. These appeared to be affected somewhat more severely than the species for which information was available up to that time from earlier operations in Canada and the United States. No doubt it is largely owing to the value of salmon fisheries on both coasts, both commercial and sport fishing, that particular attention has been focused on the adverse effects that have followed these spraying operations and that rather intensive investigations have been undertaken to study them.

Reports of studies of these problems by the Fisheries Research Board of Canada disclosed that drastic reduction occurred in the smallest age classes of salmon in some sprayed streams in both New Brunswick and British Columbia and it is feared that this will be reflected in serious reductions in the numbers of adults of these generations returning from the sea.

The maximum effects on returning salmon runs in New Brunswick are not expected until 1961, but it is encouraging to note that exceptionally good runs were reported in 1958 and 1959 in streams affected by spraying in some of the earliest years, in line with improved catches that were general for the species throughout its Atlantic range. This is good news, particularly because of the assurance it gives of prompt and adequate restocking of the species in the affected streams.

Effects on the Forest

Of more direct concern to foresters and entomologists, are results in terms of effects on the forest and on the pest and associated insects. To what extent has tree mortality been prevented and forest values protected? What have been the short and long-term effects on natural enemies of the budworm and to what extent has spraying affected the natural course of the outbreak? The salient biological results in New Brunswick have been:

(1) The objective has largely been achieved of preserving large areas of highly susceptible forest through the course of a full-scale outbreak. Except for relatively small patches, the sprayed forest remains alive and growing, while unsprayed check areas of 25 to 30 square miles reserved for the purpose provide proof that the alternative would have been widespread destruction of present and future pulpwood supplies in the region.

(2) There are no signs of serious adverse effects on the natural control complex; indeed at least one parasite and possibly some predators appear to gain in percent of effectiveness following spraying when compared to unsprayed populations.

(3) There are no signs that other pests such as mites have been encouraged.

(4) Spraying does not appear to have prolonged the outbreak by preserving the food supply of the larvae. This appears to refute a once commonly-held opinion that

the destruction of the highly susceptible forest in outbreak epicentres was a necessary prerequisite for the decline of full-scale outbreaks.

(5) Results suggest that susceptible forests could be kept alive for the duration of an outbreak by spraying every other year using the New Brunswick-Quebec technique of timing and application and the $\frac{1}{2}$ lb. DDT in $\frac{1}{2}$ gallon per acre dosage. Spraying at three-year intervals may be adequate under some circumstances, but this does not allow a sufficient margin of safety to counter the unusually severe effects that may occur in particularly unfavorable years.

(6) Additional long-term study will be necessary to assess the effect of preventing the budworm from reducing the susceptibility of the forest in the natural way. The mature forest condition that initially proved favorable for outbreak development remains largely intact and the question now arises: how soon until the next outbreak develops? Assuming this will depend only on a slackening of natural control in a period of favorable weather, it may be reasonable to expect that outbreaks may tend to recur at somewhat more frequent intervals than if they depended on the regrowth of the forest to the mature condition. Against this possibility, however, is the virtual certainty that this problem will be mitigated to a substantial degree, though probably not entirely, by increased purposeful exploitation of stands of the principal host species as these mature, and by breaking up the age structure and favoring less susceptible species in the succeeding crop.

Current Outbreak Status

Spraying was discontinued in New Brunswick and Quebec this year, because of a drastic decline in outbreak severity, beginning in some northern areas in 1957 and extending throughout the region in 1958. This year's surveys indicate that the outbreak has continued to decline and is now in an endemic condition in northern areas of

New Brunswick and in fringe areas of previous attack in southern New Brunswick, Prince Edward Island and Nova Scotia. In contrast to this favorable development, however, a marked resurgence has occurred in a residual area of outbreak in central New Brunswick. Prospects, as indicated by egg surveys just completed, are for moderate to severe feeding to occur over an area of about 2.5 million acres, namely along the southern fringe of previously sprayed areas. A condition of high hazard, in which trees are likely to be killed by a further year's severe attack, is estimated to occur on some 1.5 million acres. No decisions have yet been made about spraying plans for 1960.★★

LISTENING POST

(From Page 75)

powder per 100 gallons, about 0.32 gram per square foot being applied to each large bench. Pots used in the benches during the 3-year period were treated by dipping them in the chemicals used at the same concentration. For an untreated control a 2 × 25-foot bench was used.

Second Test: Two tests, each replicated four times, were run to determine whether chemical 5400 and dichlone would control growth of algae and moss in pots. Sand and 2-inch pots were steam-sterilized separately. After being dipped in a suspension of one of the chemicals, the pots were filled with sand.

For the trials on the control of algae an algal suspension was poured into each pot used. One week later, when the pot was covered with a light green bloom of algal growth, 25 milliliters of a suspension of one of the fungicides, at one of the concentrations listed in Table 1 was poured over the sand. To prevent contamination, each treatment set of four pots was placed in a separate plastic flat. Pots were watered when necessary. Growth of algae was

recorded at weekly intervals up to 18 weeks.

Chemical control of moss growth was similarly studied. Four rates of application, were tested. Inoculum for the moss-control studies consisted of small pads cut from moss growing on a bench. Each pad was placed on the sand in a pot and 25 milliliters of one concentration of one of the chemicals was poured over it. The four pots of each treatment set were handled as in the algae-control series. Effect of the treatments on moss was observed after 6 weeks.

Third Test: Chemical 5400 at the rate of 2 pounds of the 50-percent wettable powder per 100 gallons of water was used to treat flats of steamed soil overgrown with the fungi already mentioned.

Results

Almost complete control of all three types of nuisance growth resulted from treatment with chemical 5400 in the first test. Treated

pots and benches remained free for 2½ to 3 months after one treatment with chemical 5400 and for 2 months after one treatment with dichlone. A mat of algal and moss growth that had to be cleaned out each year covered the untreated small bench. The heating coils in the benches were not harmed by either chemical. Sand treated with chemical 5400 showed a light-brown discoloration that disappeared after several waterings.

The pot treatments in the second test gave results reported in Table 1 for algae and Table 2 for mosses.

Chemical 5400 at the two highest concentrations used for algae, 800 and 1200 parts per million, completely prevented algal growth for the 18 weeks of the test's duration, indicating a lasting residual effect. The dichlone treatments at the same rates gave partial control at 18 weeks (Table 1).

Growth of mosses was not so completely controlled (Table 2).

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At the highest rate of application (2 pounds in 100 gallons) chemical 5400 was 86.3 percent and dichlone 32.5 percent effective after 6 weeks. At lower rates dichlone gave no control, while control with chemical 5400 ranged downward from 50 percent. After 6 weeks the moss resumed growth. These results show that chemical 5400 applied to soil before moss becomes established will give practical control of its growth.

In the third test fungi present in flats of steamed soil at the time of treatment disappeared soon after application of chemical 5400 and thereafter the flats remained free from fungus growth.

The author states that, as an incidental additional benefit, control of mosses and algae has also eliminated slug damage. Even when reintroduced from other sections of the greenhouse the pests soon disappear.★★

PEST ROUNDUP

(From Page 73)

The meadow spittlebug survey was concluded in September. The outlook for 1960 was for slightly lighter populations than in 1959. As in 1958, the heaviest populations were found in the northern area of the State, but these were rated as moderate. Light infestations were recorded for the north central area with noneconomic numbers being found in the remainder of the State.

Although by September the cotton season was well advanced, bollworms were still causing concern in certain areas. Heavy infestations of bollworms were reported in cotton in the Shafter and Delano areas of Kern County, California. Controls were still necessary in some Imperial County fields. Populations of the insect were statewide in Arizona with considerable loss of squares and bolls being reported from the central section. In Nevada the number of bolls infested by the boll-

worm was approximately three times greater than in any previous year. Damage from the bollworm was also recorded from Tennessee.

Even though the season was extremely late, heavy infestations of the boll weevil necessitated one of the most extensive late season treatment programs ever experienced in McCormick County, South Carolina. In north central Texas, one of the heaviest late season boll weevil buildups ever noted was reported in early September.

A recent survey indicated that spruce budworm egg masses on about 600,000 acres in northern New Mexico were approximately three times the number found in 1958. In Texas approximately 17,000 acres of loblolly pines were treated for a pine sawfly during July and August. The area treated was in a section severely defoliated in the fall of 1958 and threatened again this year. Although treatment was expected to reduce the population to a low level, there was concern about a possible buildup again this fall and next year.★★

GAS FIRED DRIER

(From Page 41)

content. A total of 4000 lbs. of moisture per hour is removed from the pellets, and emitted as steam through a stack venting to the atmosphere. Then the dry pellets go to a rotary-type cooler and on through a classifying screen.

"If I had to pick out one segment of the process without which granulated fertilizer would not be possible, I'd have to pick the gas-fired furnace and dryer," Mr. Spillman decided.

Stressing the importance of unfailing dryer operation Mr. Spillman explained, "Down-time in any part of our continuous system would hold up the entire operation. For example, if the lining of our drier required frequent repair, we'd face a double expense—maintenance costs, as well as the

time and production lost due to shut-down.

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"Possibility of break-down is minimized by our furnace lining. The entire lining is a single and continuous piece, even around the tempering air inlets. This is made possible through use of monolithic refractory materials to form a jointless lining.

"As you know, elimination of joints stops trouble at its source. Joints permit dust penetration, resulting in a build-up which gradually leads to lining failure."

Precise placement of the dryer's tempering air inlets as well as the engineering and installation of the monolithic lining was handled by R. H. Wilder of Plibrico Sales & Service Company, Baltimore, Maryland. The entire lining is formed with Plibrico Standard Air-Bond manufactured by Plibrico Company, Chicago, Illinois.

In the furnace section the lining is 8" thick and the Air-Bond feature of Plibrico Standard provides greater strength uniformly through the entire lining thickness. Embedded in the refractory are anchors that not only hold the lining securely in place, but also localize and simplify future repairs. The transition chamber is lined to a thickness of 4½" and is also fully anchored.★★

GRANULAR'S IN 1959

(From Page 32)

Noble Manufacturing Company; John Deere markets a planter attachment for applying granular soil insecticides.

With this growing tendency on the part of the major equipment companies to market granular applicators, and to sell planters fully equipped with these devices, the future market potentials for granular pesticides of several types look very attractive.★★

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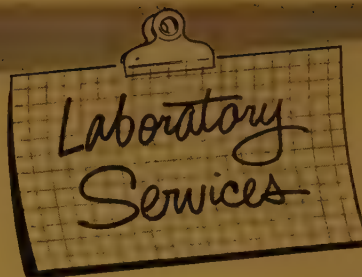
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CONTROL OFFICIALS

(From Page 47)

since the term "fertilizer" seems to have been replaced more generally in the industry by the term "plant food".

At a meeting of the states relations committee preceding the formal AAFCO program, discussion centered on the problem presented by custom mixing of fertilizers. It was generally agreed that custom mixed fertilizers should be subject to registration, inspection and analysis under fertilizer laws. And, consequently, control officials, it was asserted, should have the same responsibility for regulating custom mixed products that they do for grade list fertilizers. The practical solution to regulating and restricting custom mixed fertilizers is still to be solved, however.★★

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Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 2383).

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Signed—Wayne E. Dorland, Publisher

Sworn to and subscribed before me this 15th day of September, 1959.

(SEAL)

David Tryon

(My commission expires May 11, 1964)

INVENTORY CONTROL

(From Page 57)

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(To Be Concluded)

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NEW HERBICIDE

(From Page 53)

existing equipment and further develop the chemical, before obligating themselves for any large sums of capital investment. "The plant," remarked Mr. Bingham, could easily become a part of either the Henderson, Kentucky Works, or the Jayhawk Works . . . or we can contract for the entire production. Quality, dependability and economics will dictate."

AC

RONALD D. HENTSCH has joined the Chemical Plant Division of the Foster Wheeler Corp., New York, as project manager. He had been with the Chemical & Industrial Corp., Cincinnati.

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GORDON E. HOATH has been named manager of fertilizer manufacturing for Consumers Cooperative Association, Kansas City, Mo. He had been manager of CCA's fertilizer and protein plants at Eagle Grove, Iowa.

FERTILIZER VIEWS

(From Page 76)

years, prior to the appearance of these two bulletins from the Connecticut Station he had advocated the use of tobacco fertilizers formulated with water soluble nitrogenous materials to Connecticut Valley tobacco growers. The resistance to the acceptance of such fertilizers was adamant and was sustained primarily by the dictation of tobacco buyers. They were able to impose their views on the grower through the threat of penalties on the purchase price of the tobacco.

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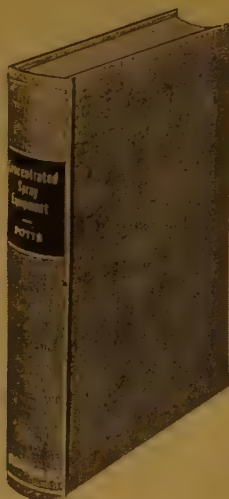
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Samuel Frederick Potts, author of this new book, has been in the agricultural chemicals industry for more than 30 years. He has published more than 70 articles, booklets, etc., on various phases of the industry. He has also been instrumental in designing new equipment and improvements in equipment for the application of agricultural chemicals.

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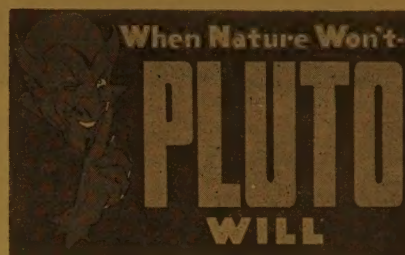
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TALE ENDS

THE general consensus on French Lick Springs as a convention site for the NAC meeting was that, after you once got there, it was a pretty fair spot. The money invested by Sheraton to refurbish the old Indiana spa was clearly evident in the improved facilities, the food was good, and the staff was willing and anxious to please. And, besides, any place would have been a long step up after the General Oglethorpe in the Georgia swamps.

There was more than the usual interest in the luncheon address by Dr. Earl Butz, dean of the Purdue College of Agriculture, at the NAC session. Farming in the U. S. is rapidly taking on much of the character of "big business", Dr. Butz pointed out. Farms are becoming more like other businesses in that they acquire more and more of their goods and services rather than producing them on the farm. In large measure, the farmer has become the

manager of a manufacturing operation. Total capital assets on our farms now exceed 200 billion. America's investment in "agribusiness", Dr. Butz stated, exceeds the total industrial assets.



Jack Vernon, NAC president, predicted a billion dollar sales total for the ag chem industry by 1975 in his presidential address. He put the present industry volume at 265 million dollars. There are those in the industry, incidentally, who take the position that volume should be figured on the basis of cost price to the farmer for all the pesticide applied, rather than value of the toxicants alone at the manufacturers level.

Figured on this basis, the industry, they estimate, is already doing a volume of somewhere between \$600,000,000 and \$800,000,000. They argue that the value of the diluents used, the emulsifiers, solvents, containers, etc. are just as much a part of the finished pesticide as the basic toxicant, and that it is unrealistic to ignore these items in evaluating the size of the industry. And they feel that it is logical, too, to include the cost of transportation, overhead, sales costs, profits, etc. in figuring the amount spent by the nation's agricultural industry on crop protection. Besides which, figured this way, we of course end up with a much bigger and more impressive figure.

— AC —

A British company is introducing into the U. S. an organic compound which, they say, can be applied either as a foliar spray or as a soil fertilizer with equally spectacular results. Known as "Sea-Magic", it is said to be 80% seaweed, with the remaining 20% consisting of a mixture of half a dozen land plants — among them an aphid-inhibiting oak-bark — which, combined with the seaweed extract, is said to provide all the trace elements necessary for healthy plant life. We expect to see some glowing testimonials for this product shortly. The green thumb boys always go for the "magic" theme in gardening.

— AC —

A couple well informed fertilizer production experts told us recently that it is rather surprising to them to observe that some well known engineering construction firms have stubbed their toes badly in the design and engineering of fertilizer granulation plants. Well at home in the general engineering and construction field, they however knew nothing about granulation, much less fertilizer production. And, as might have been expected, some rather expensive and inefficient plants resulted.

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